



Fortinet Hardware Schematics

September 2023

Internal & Partners only. NDA required for external use

FortiASIC



FortiASIC NP7 Overview



1 channel of x8 PCIe Host Interfaces to CPU

Various I/O Configurations:

- 2x 100G interfaces
- 8x 25G interfaces, etc

6 Channel of x32 DDR4 @ 2400Gbps DRAM

FortiASIC CP9 Overview



Latest generation Content Processor designed to accelerate computationally intensive tasks

Content processing support:

- ✓ VPN
- ✓ SSL offloading
- ✓ Flow based UTM

- Content processing offload and HW encryption.
- Performance enhancement dependent on CPU architecture and speed



Comparing Fortinet SPU

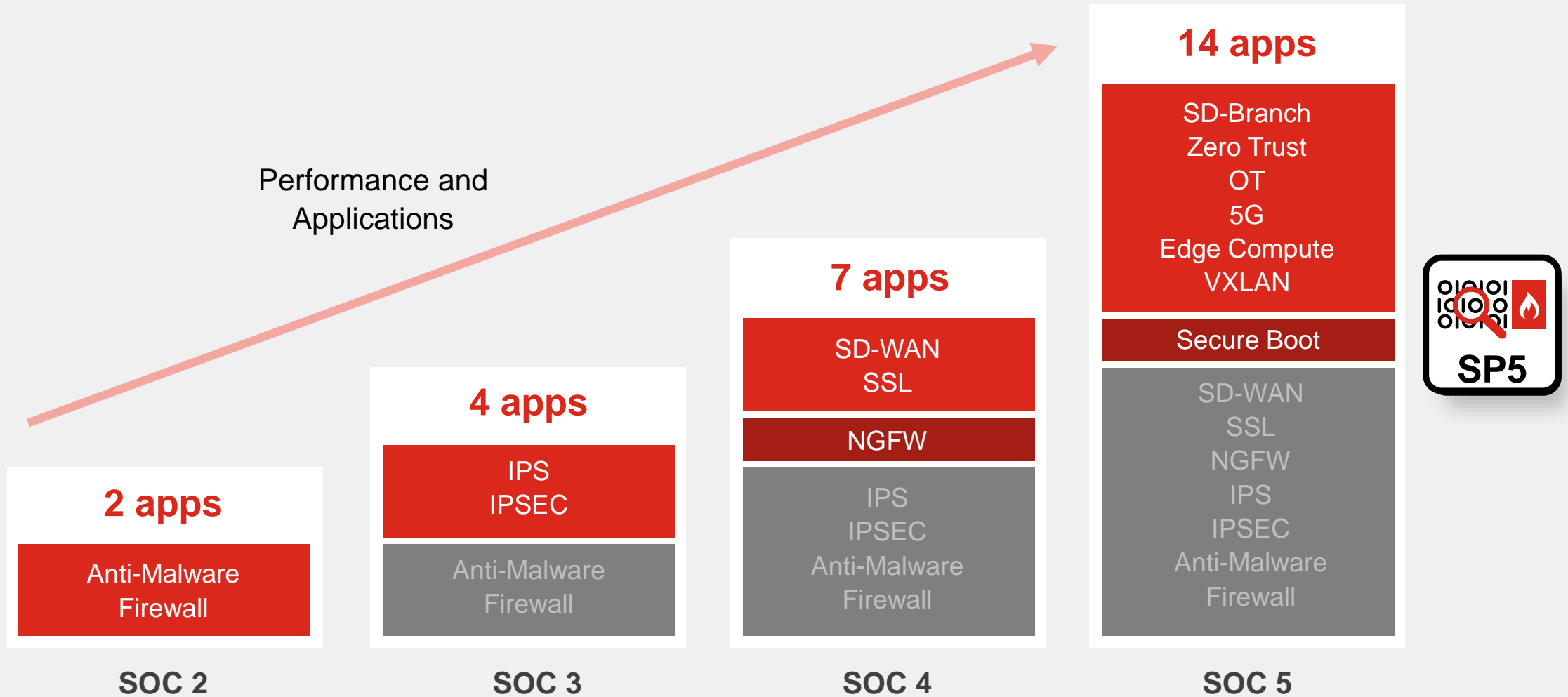
	SoC1	SoC2	SoC3	SoC4	SP5	NP2	NP4	NP6	NP7	CP8	CP9
Processor	ARMv5 @ 533 MHz	Dual-core ARMv5 @ 800 MHz	Quad-core ARMv7 Cortex A9 @ 1 GHz	Octa-core ARMv8 up to 1.4 GHz	Dual Octa-core ARM	-	-	-	-	-	-
Process Node	130 nm	55 nm	40 nm	28 nm	7 nm	180 nm	130 nm	40 nm	28 nm	90 nm	40 nm
Gate Count	10.6 Million	19.5 Million	72.7 Million	108.4 Million	450 Million	9 Million	31 Million	104 Million	422 Million	15 Million	37 Million
DMIPS	760	1920	10,000	26,000	80,000	-	-	-	-	-	-
Memory	-	-	-	-	DDR x32 @ 3200Mhz	DDR x32 @ 333 Mhz	2x DDR2 x72 @ 533 MHz	3x DDR3 x16 @1600 MHz	6x DDR4 x 32 @ 2400 MHz	-	-
Network Ports	-	-	-	-	4x 1/ 2.5 / 5 / 10 GE	GE x4	10 GE x2	10 GE x4	100 GE x2 25/10 GE x8	-	-
FW throughput	2 Gbps	4 Gbps	10 Gbps	36 Gbps	40 Gbps	4 Gbps	20 Gbps	40 Gbps	200 Gbps	-	-
IPSec Throughput	100 Mbps	1 Gbps	> 3 Gbps	14 Gbps	37 Gbps	2 Gbps	10 Gbps	30 Gbps	75 Gbps	10 Gbps	44 Gbps

* Future release

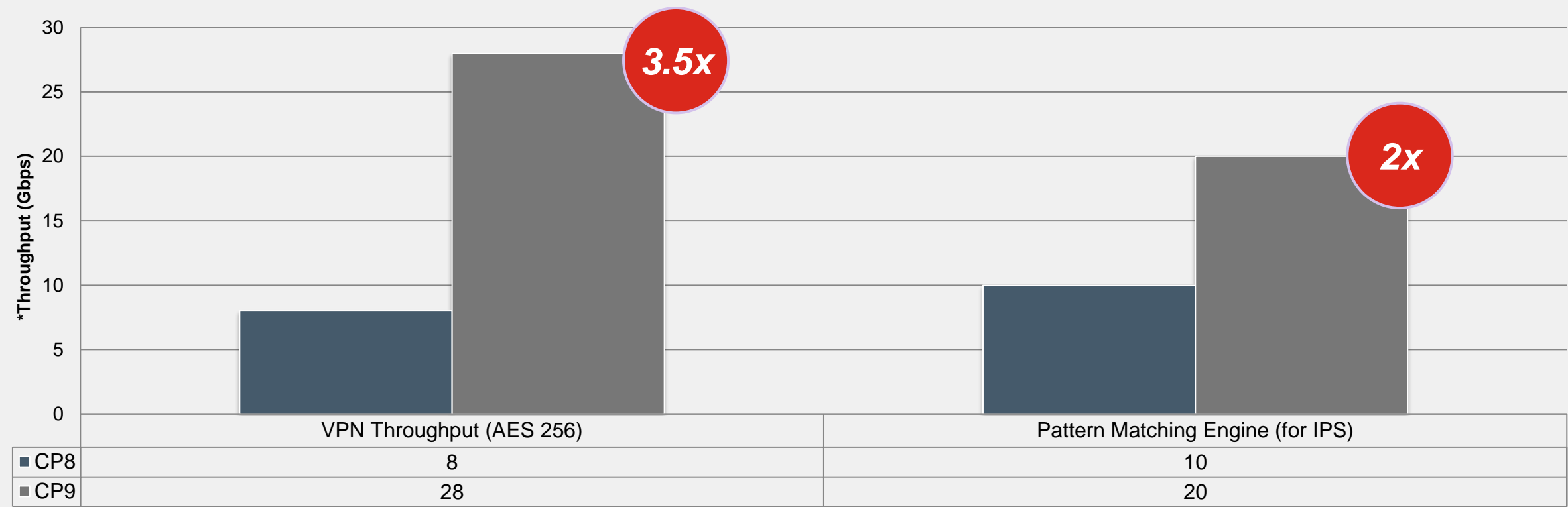


Application-Specific Design & Multi-Core Processors

FortiSP5 concurrently supports 2x more applications than the previous generation



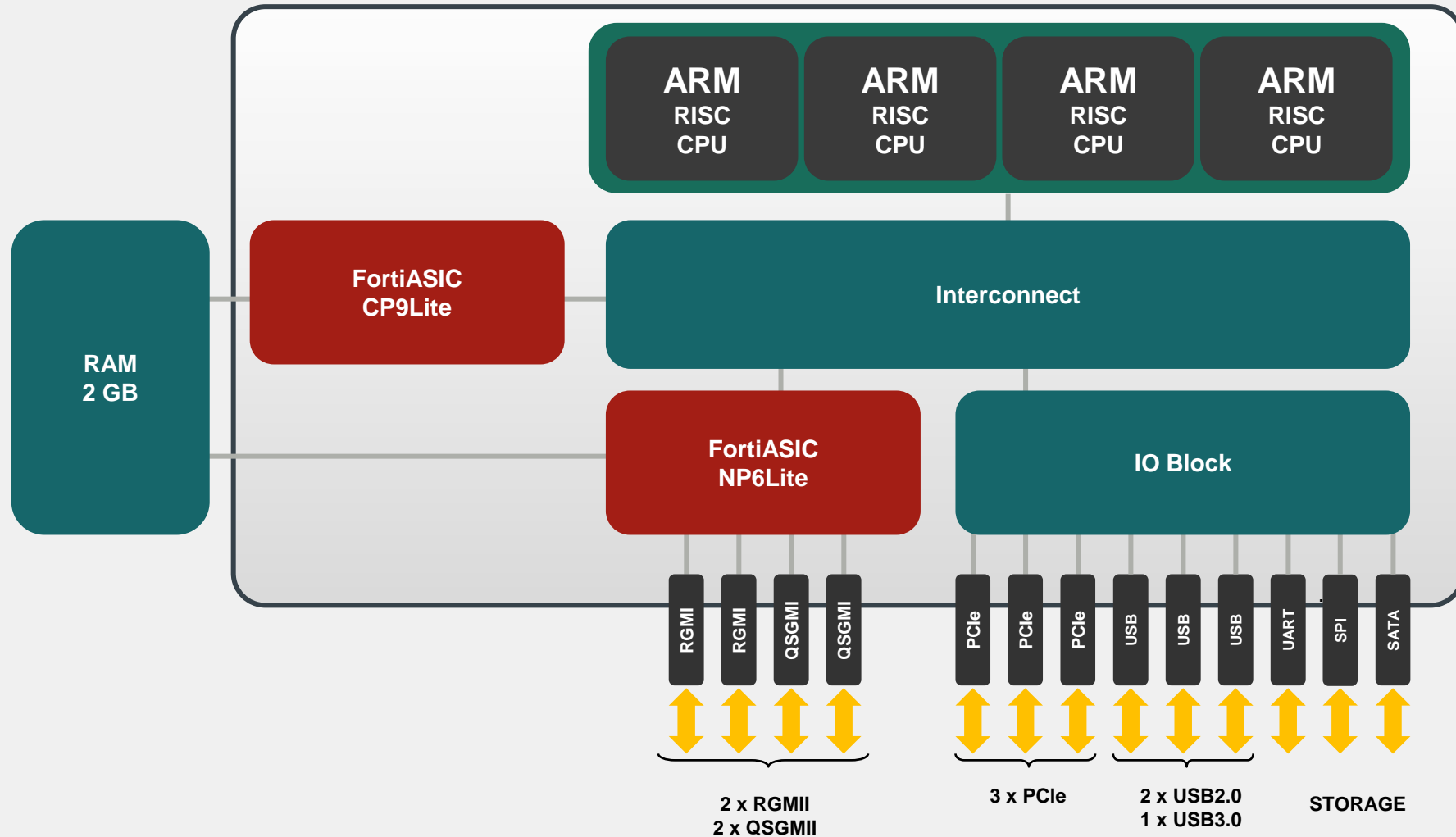
Content Processor Comparison



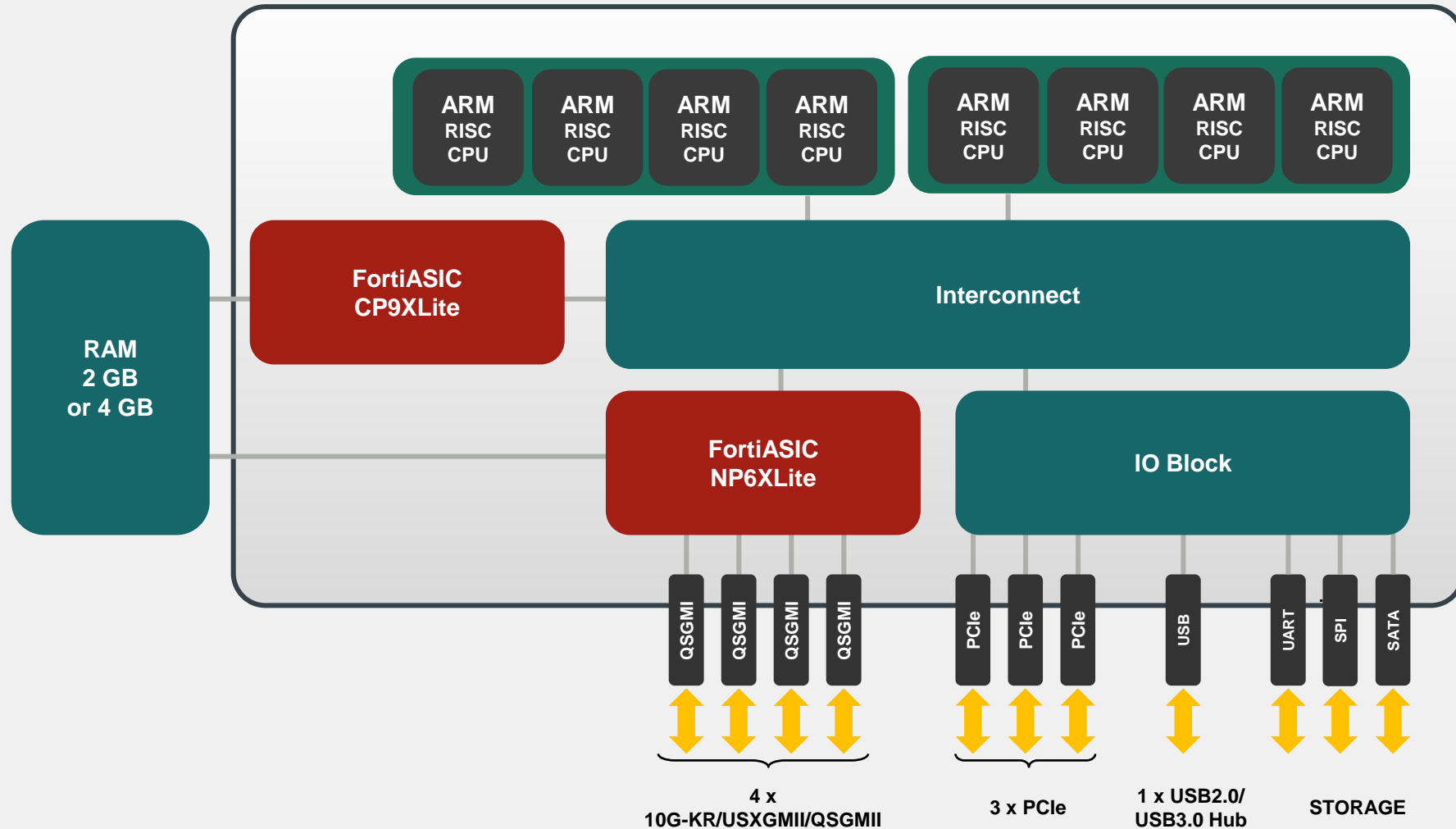
	CP8	CP9
VPN NSA "SuiteB" support	-	✓
IPS Full-match Offload	-	✓
TRNG (True Random Number Generator)	-	✓



SoC3 Block Diagram



SoC4 Block Diagram

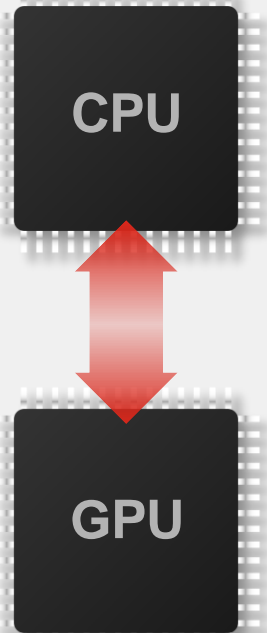




Fortinet Designed Security Processing Unit (SPU)

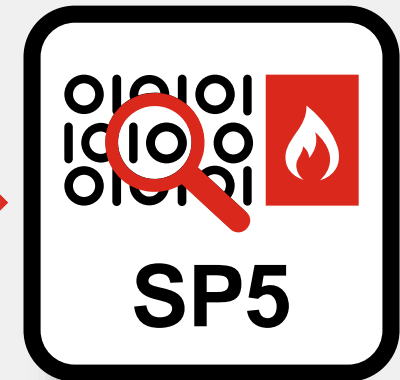
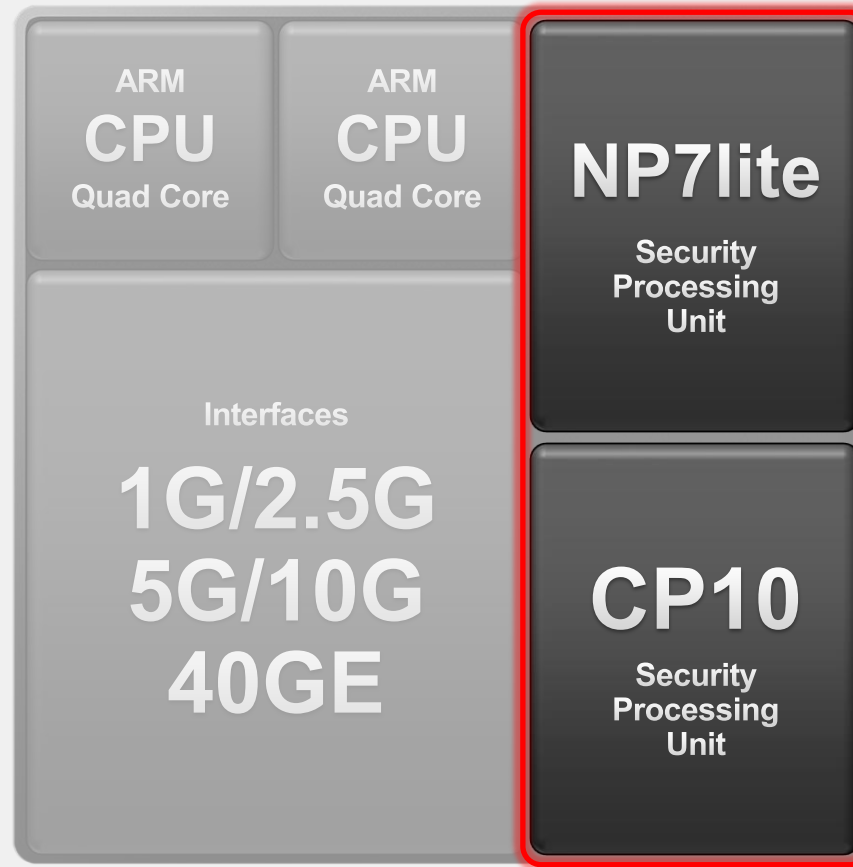
Off Loading the Networking and Security Functions

Gaming and AI Systems



Graphical Processing Unit (GPU)

Off-Loads graphic's rendering compute from the CPU



NP7 + CP10 creates
SP5



SoC Comparison

	SoC2	SoC3	SoC4	SP5
Chip Technology	55 nm	40 nm	28 nm	7nm
Processor	ARM v5 Dual @ 800MHz	ARM v7 -Cortex Quad @ 1GHz	2x ARM Cortex-A53 @ 1.4 GHz	Cortex A76 Quad x2 @ 2.1~2.4GHz
Memory	DDR3 x32 @1333MHz	DDR3 x32 @1600MHz	DDR4 x32 @2400MHz	DDR4 x32 @3200MHz
Physical Interface	RGMII x4	QSGMII x2 + RGMII x2	10G-KR/USXGMII/QSGMII x4 + RGMII x2	10G-KR/USXGMII/QSGMII/SGMII x4 + 40G-KR4
Fortinet IPs	NP4Lite	NP6Lite	NP6XLite	NP7Lite
	CP8Lite	CP9Lite	CP9XLite	CP10



SoC3, SoC4 vs NP Comparison

	NP6 Lite (SoC3)	NP6X Lite (SoC4)	NP6
Max Throughput	10Gbps	36 Gbps	40Gbps
Max Search PPS	10MPPS	25MPPS	40MPPS
IPSec Throughput	3Gbps	14 Gbps	25Gbps
Physical Interface	2x QSGMII + 2x RGMII	4x KR/USXGMII/QSGMII + 2x(1x) RGMII	4x XAUI/4x QSGMII
MaxLIF	256	256	1024
Host Interface Queue	16	32	128
IP Tunnel Support	•	•	•
IPv6Support	•	•	•
CAPWAP Support	-	•	•
Syn Proxy/DNS Helper	-	•	•
Traffic Shaper/Counter	16M with 1K cache	16M with 1K cache	16M with 4K cache



SoC3, SoC4 vs CP9 Comparison

	CP9 Lite (SoC3)	CP9X Lite (SoC4)	CP9
No. of VPN Engines	1	2	16
Throughput (AES 256)	1.7Gbps	5 Gbps	28Gbps
Throughput (SHA2 256/64B)	1Gbps	3 Gbps	16Gbps
Throughput (SHA2 256/1024B)	2.8Gbps	5 Gbps	44Gbps
No. of Physical Queues	2	4	32
No. of Virtual Queues	8	16	128
RSA (1024-bit)	400	600	1.2K
ECC (P-256)	-	6 K	22K
M S/KM Generation (Hash)	-	-	●
No. of Virtual Queues	8	8	128

* Performance may varied according to models
due to hardware architecture designs

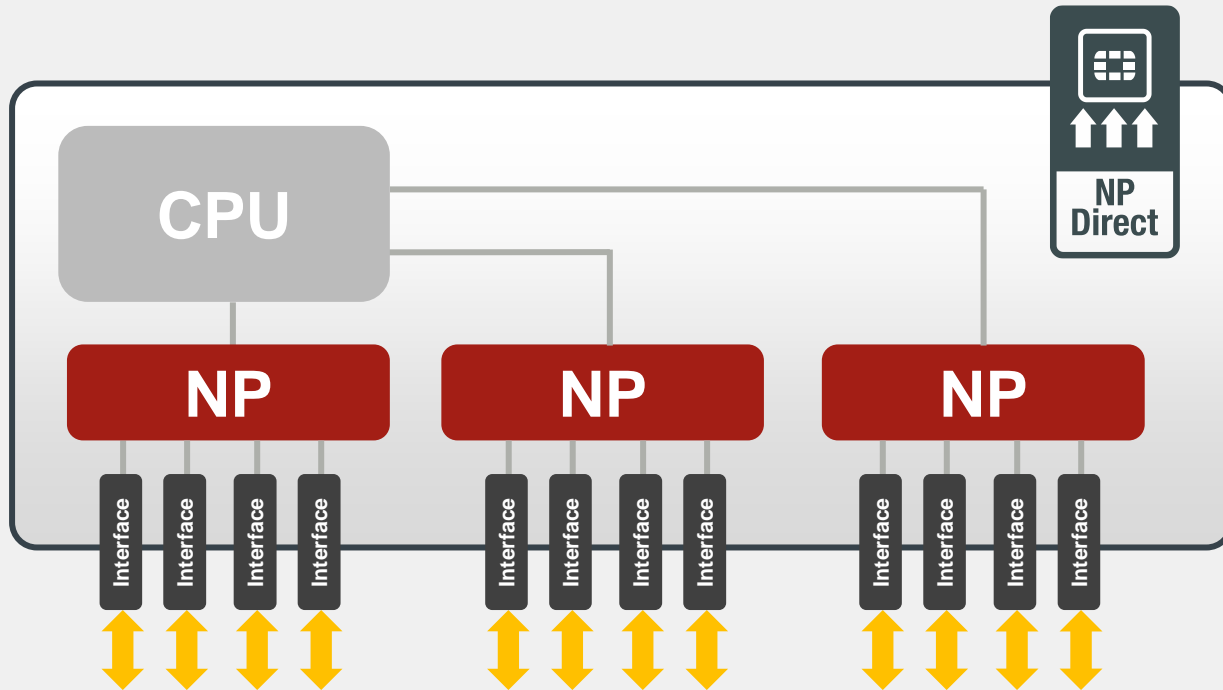


SoC3, SoC4 vs CP9 Comparison

	CP9 Lite (SoC3)	CP9X Lite (SoC4)	CP9
DFA (for IPS) Throughput	500 Mbps	1.5 Gbps	20Gbps
Pre-match Offload	●	●	●
Correlation Offload	●	●	●
Full-match Offload	-	-	●
No. of Physical Queue	2	8	32
No. of Virtual Queue	2	16	128
TRNG PLL Entropy Source	-	-	●
Ring OSC Entropy Source	●	●	●




NP Direct




An hardware architecture that has FortiASIC Network Processor(s) directly connected to Interfaces

- No ISF, may not have / limited Inter-NP connectivity
- Traffic between interfaces may not be NP-accelerated as they may have to use CPU instead
 - More suitable for NGFW deployments
- Attention needed for some network designs, eg. LAG

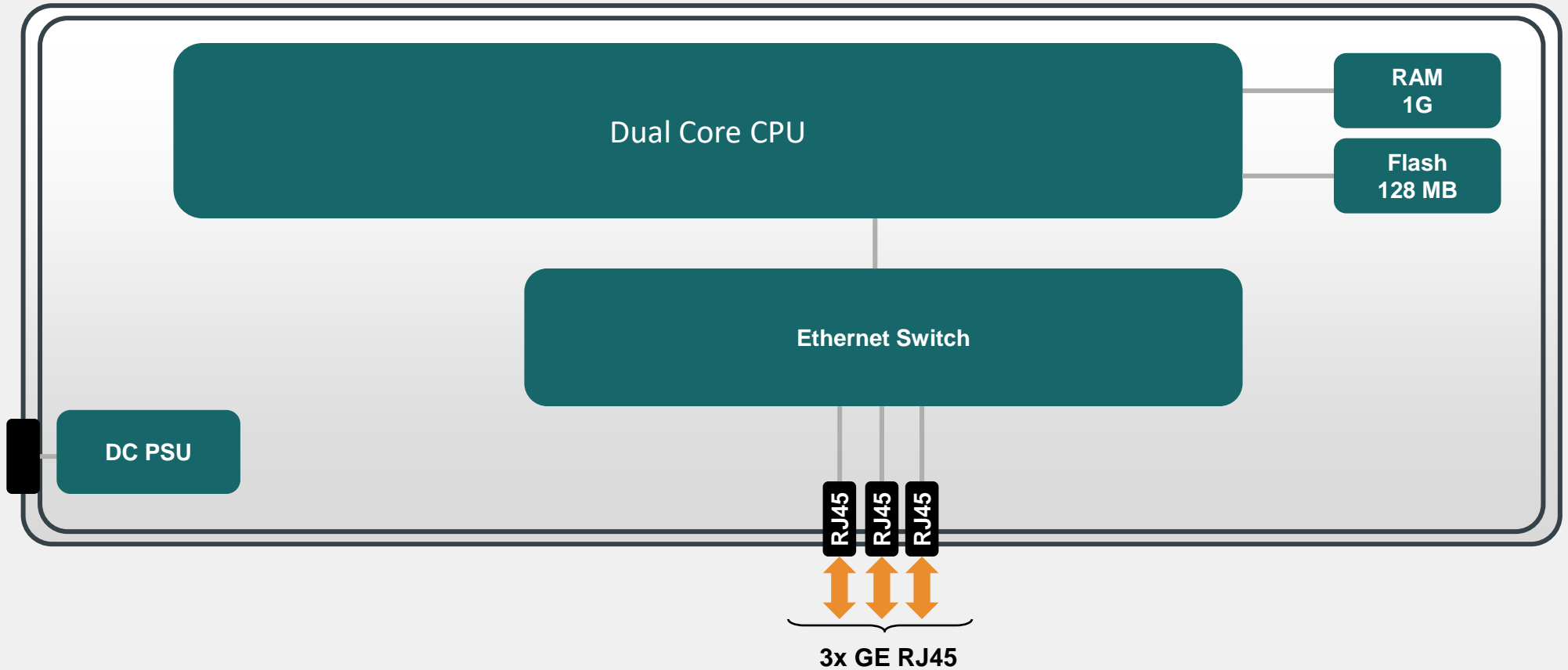




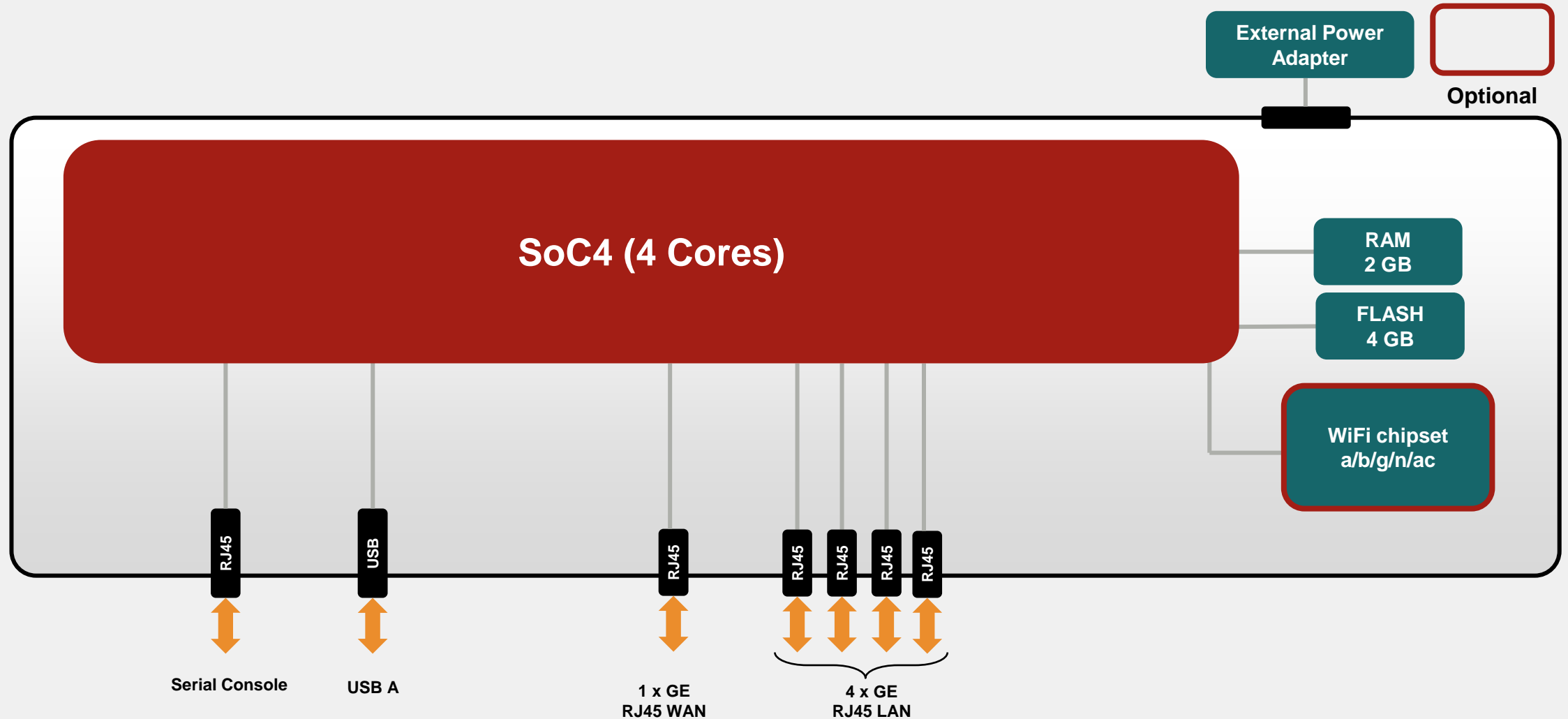
FortiGate – Entry Level



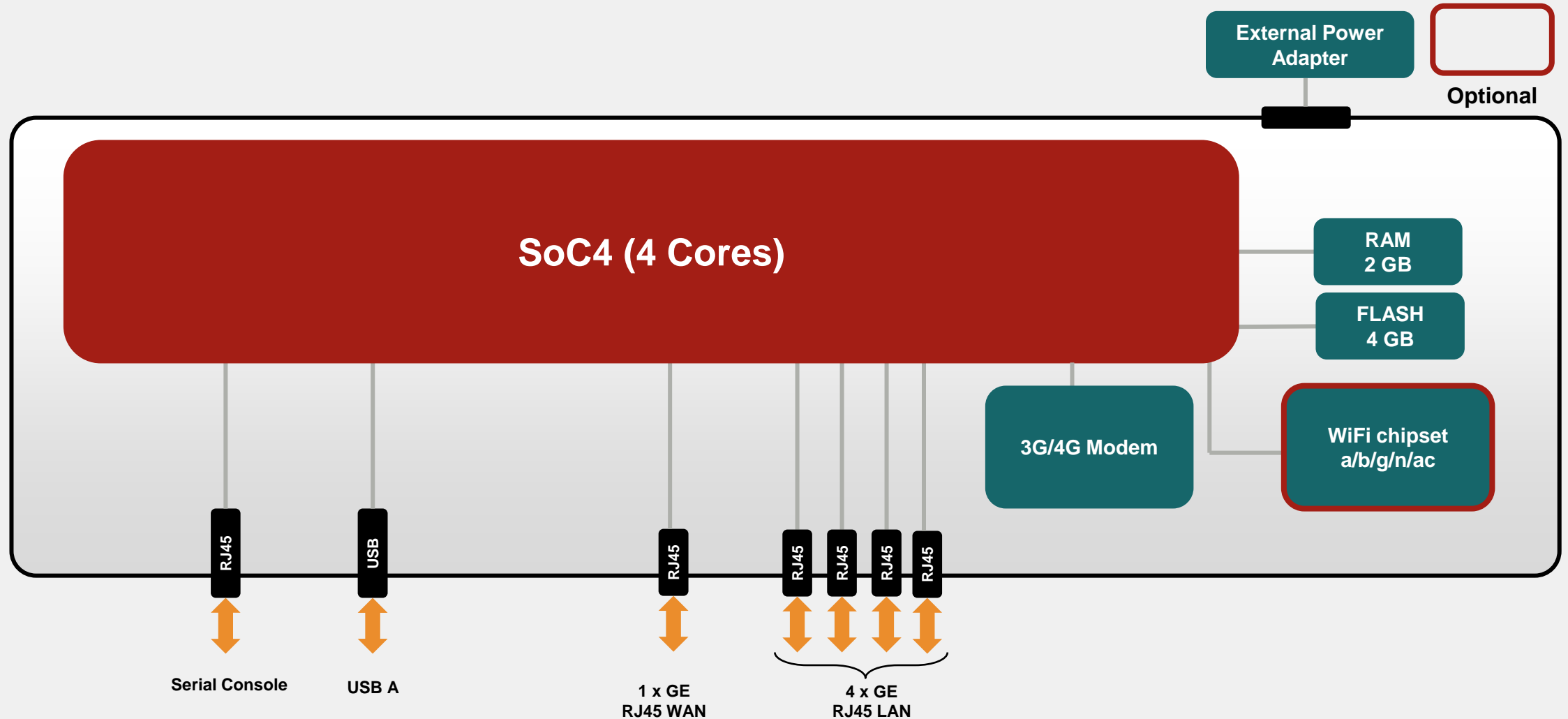
FortiGate Rugged-35D Schematic



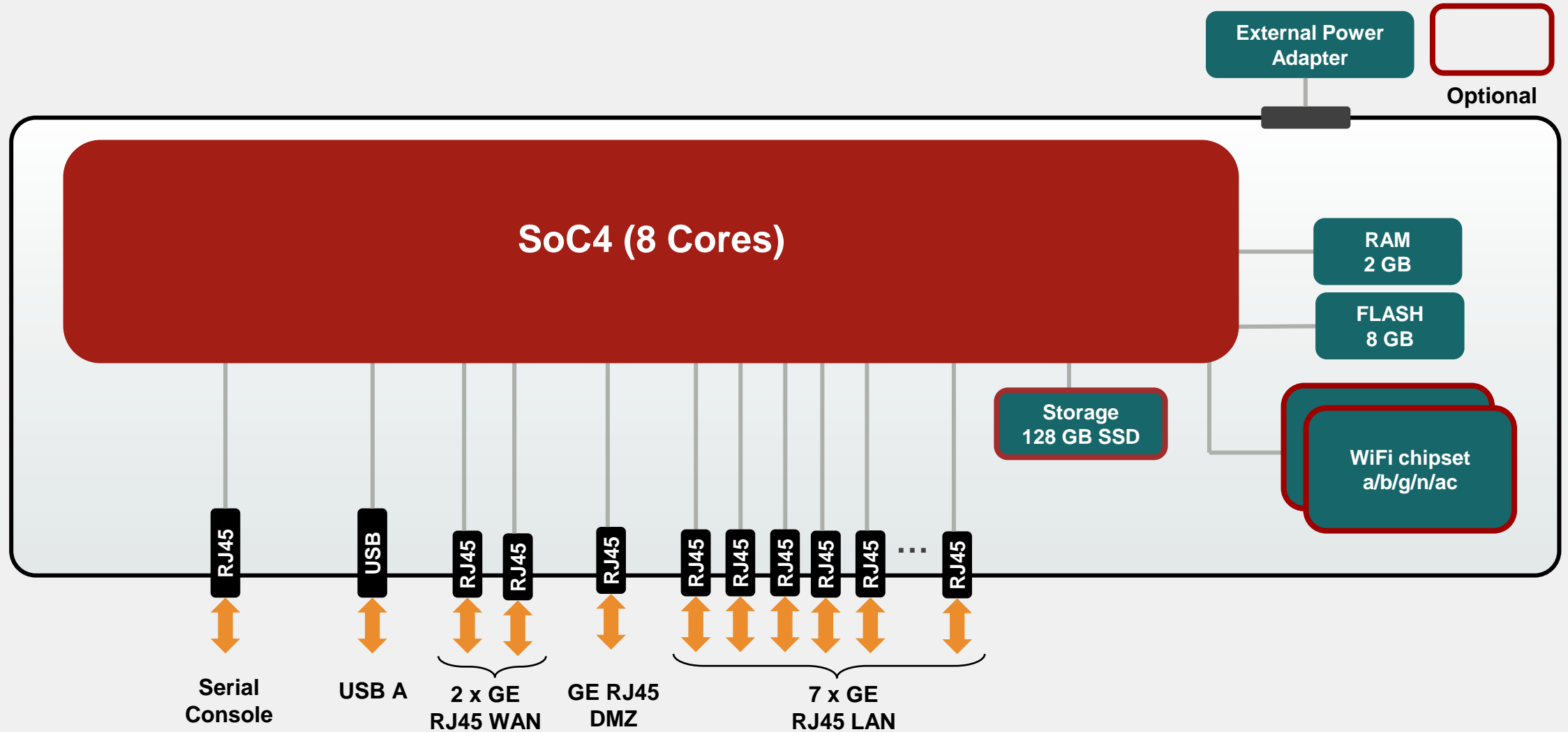
FortiGate/FortiWiFi 40F Schematic



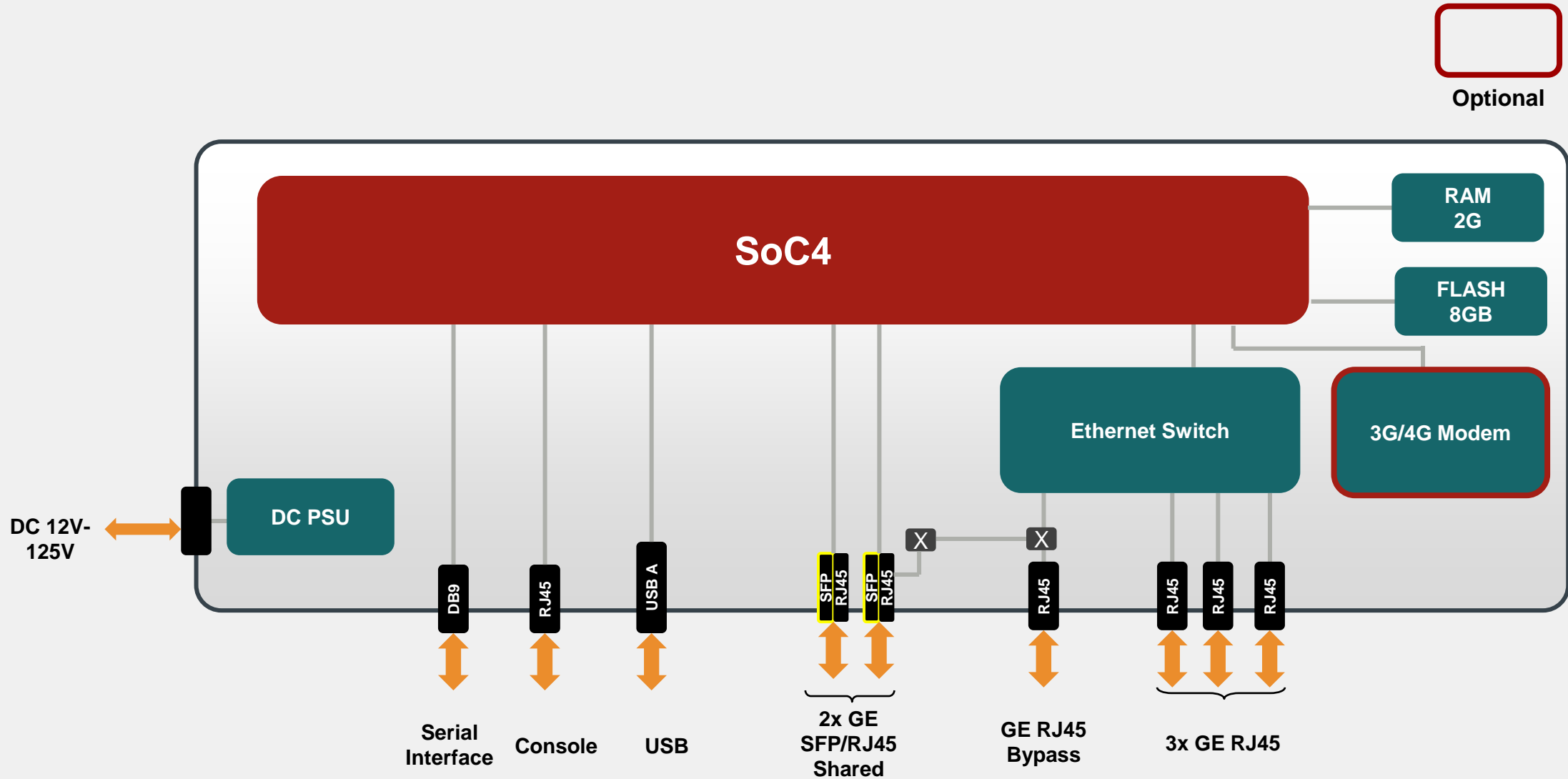
FortiGate/FortiWiFi 40F-3G4G Schematic



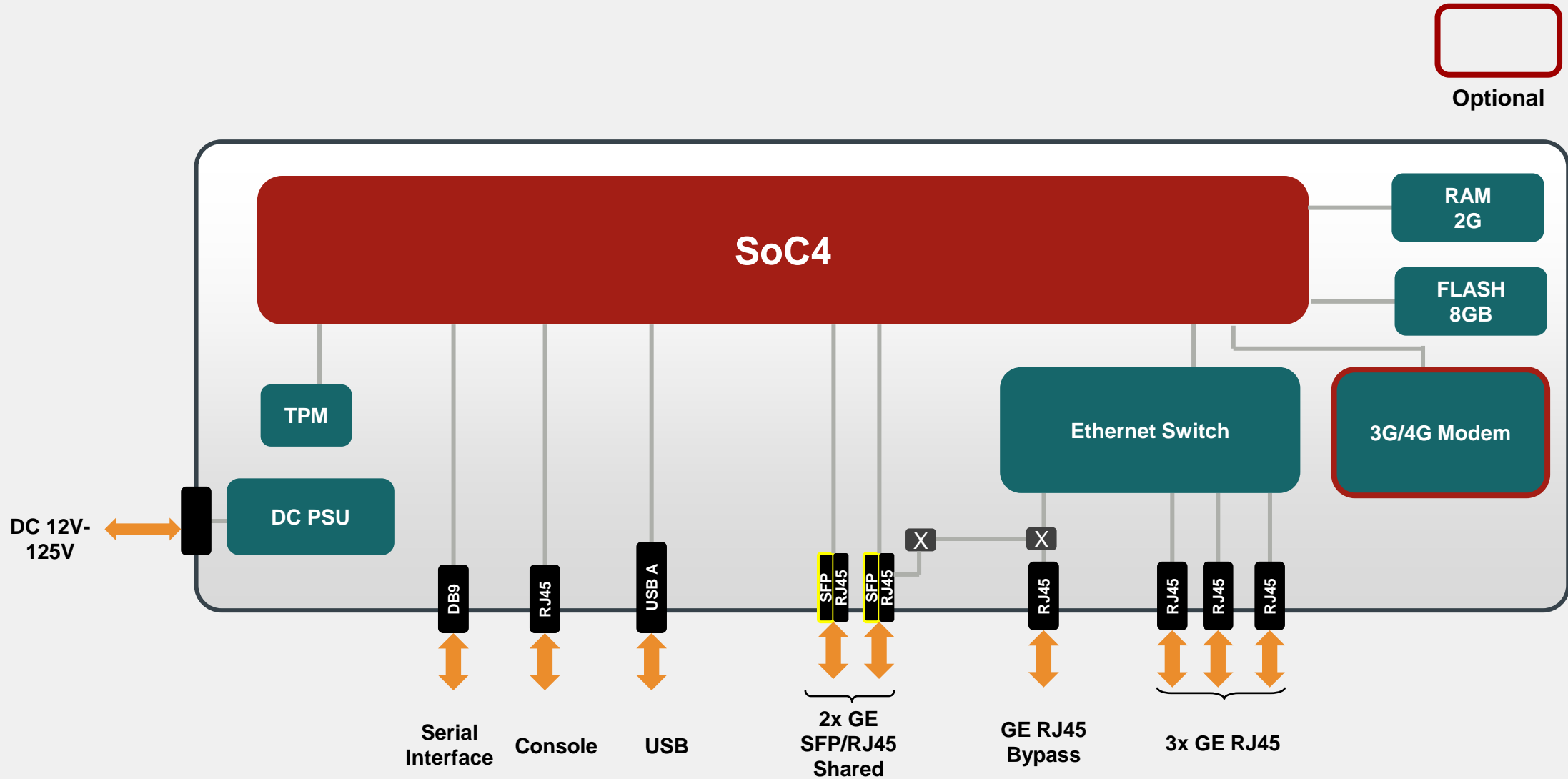
FortiGate/FortiWiFi 60/61F Schematic



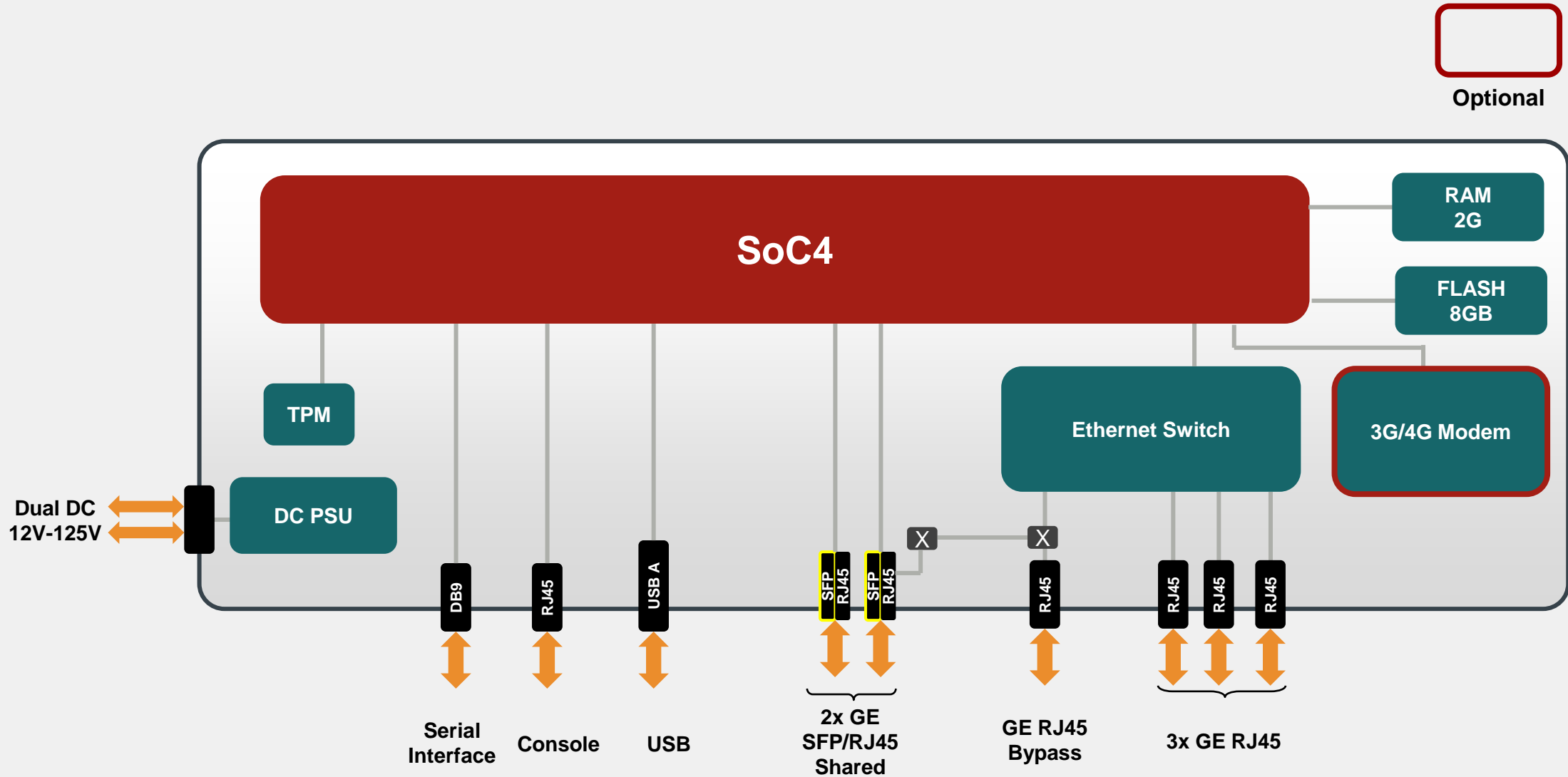
FortiGate Rugged-60F/-3G4G Schematic



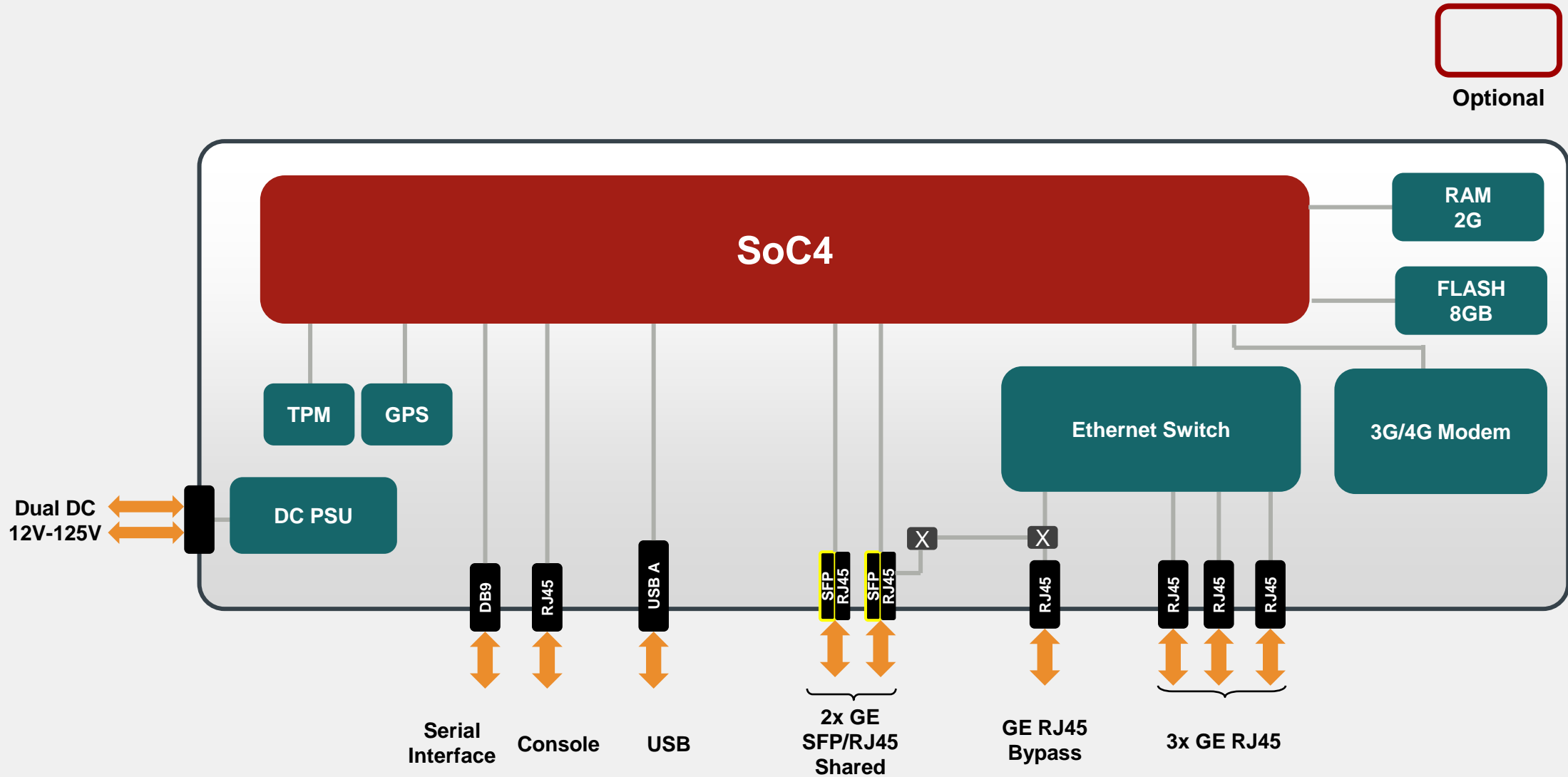
FortiGate Rugged-60F/-3G4G Gen2 Schematic



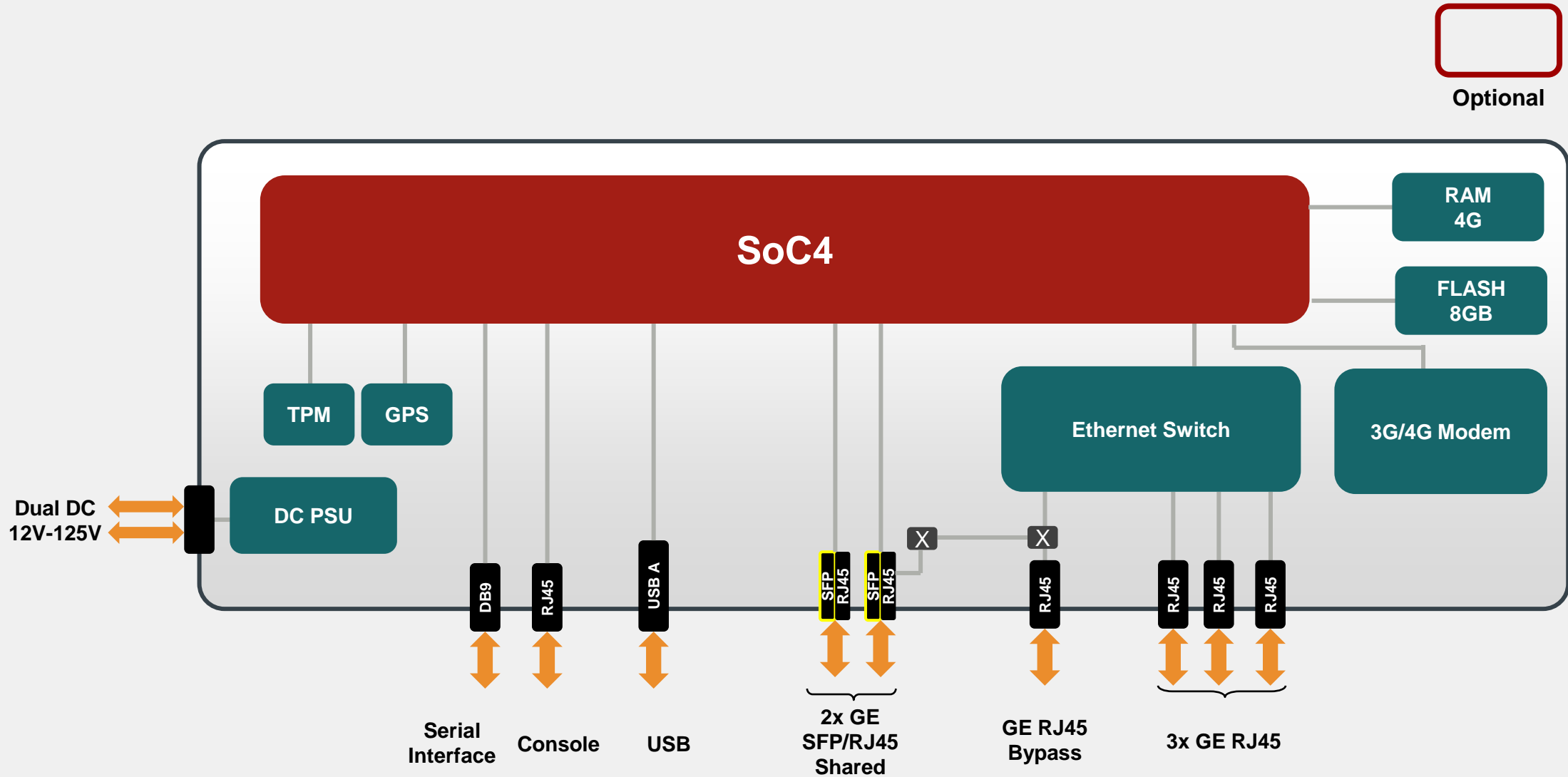
FortiGate Rugged-60F/-3G4G Gen3 Schematic



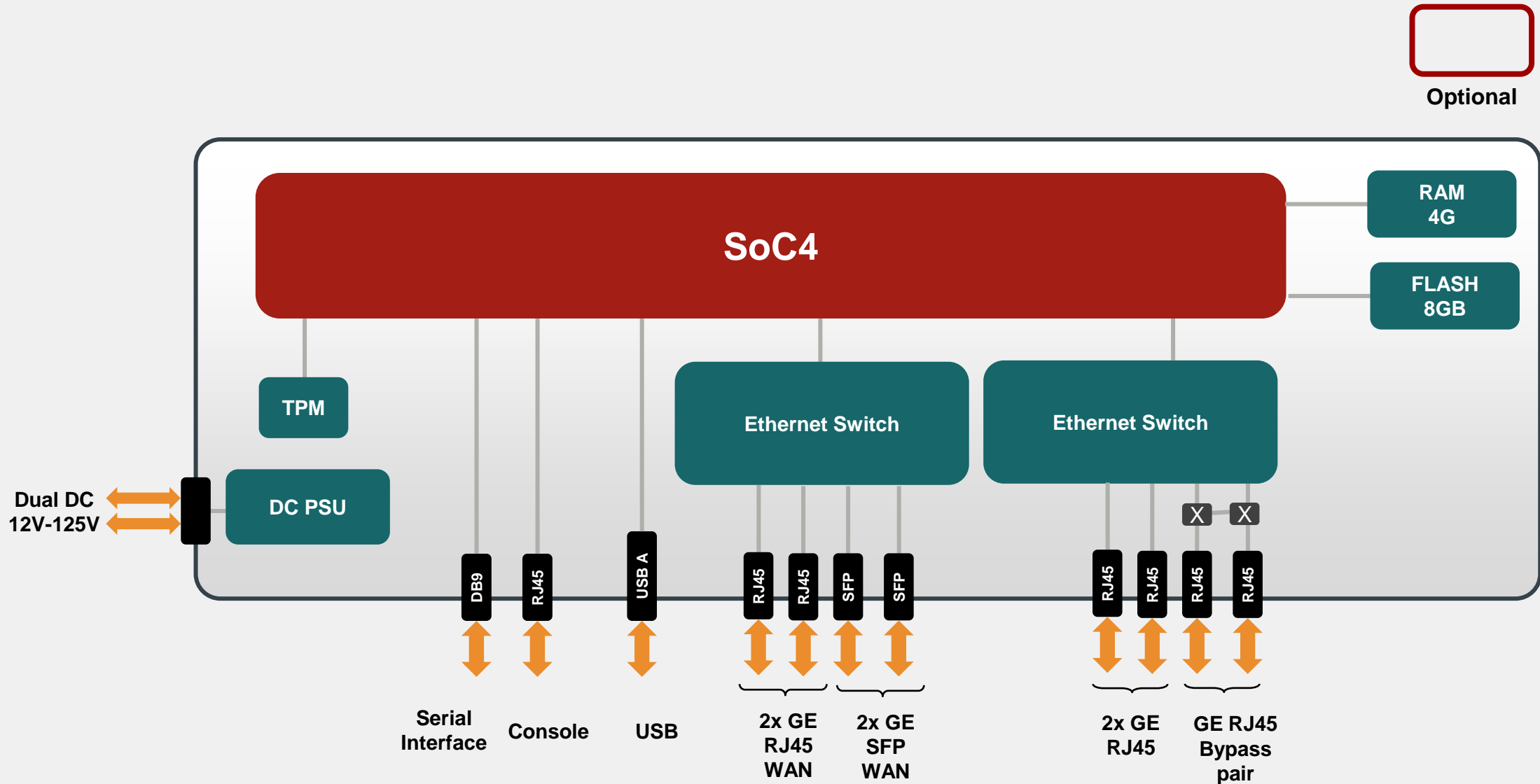
FortiGate Rugged-60F/-3G4G Gen4 Schematic



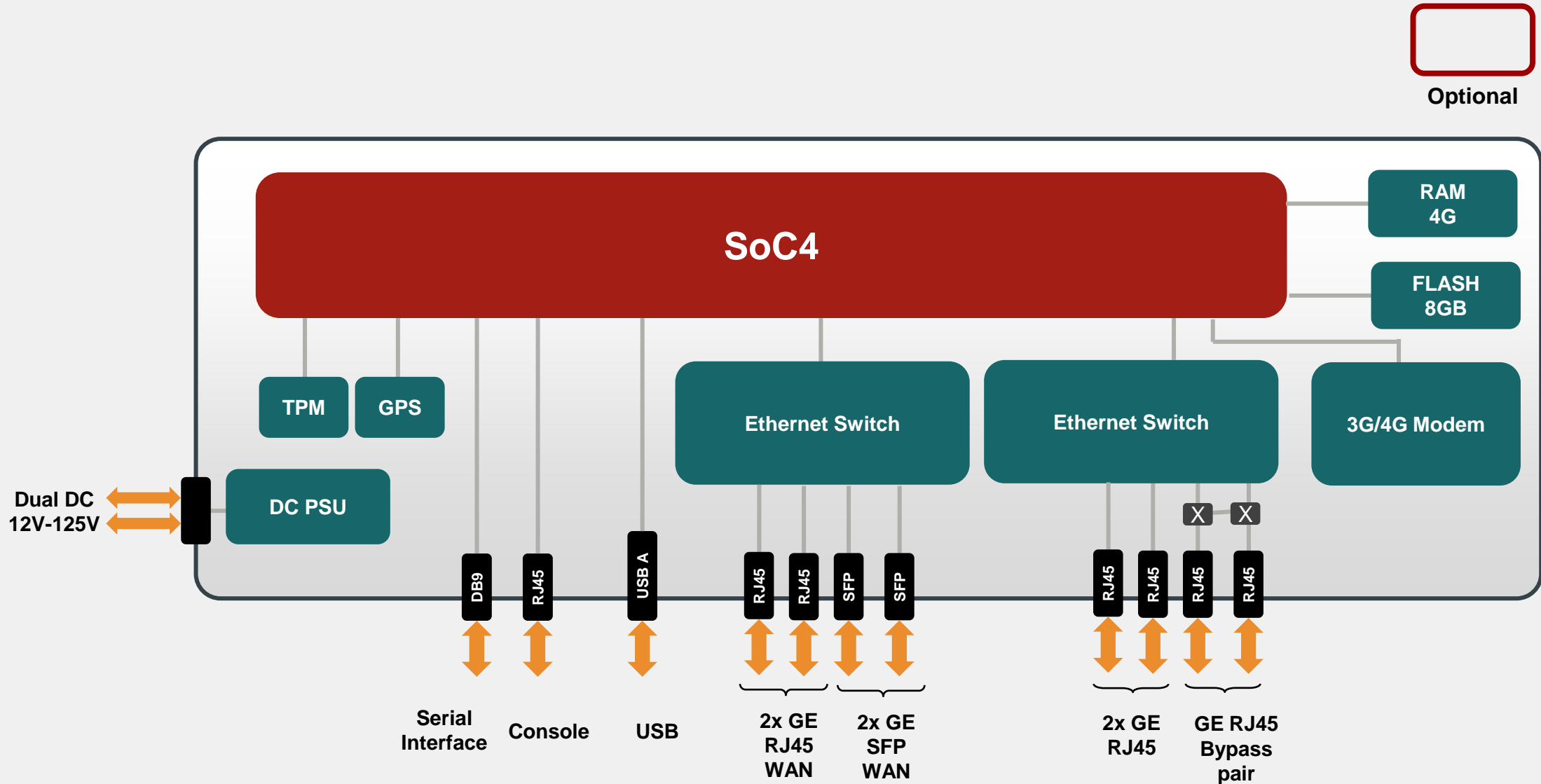
FortiGate Rugged-60F/-3G4G Gen5 Schematic



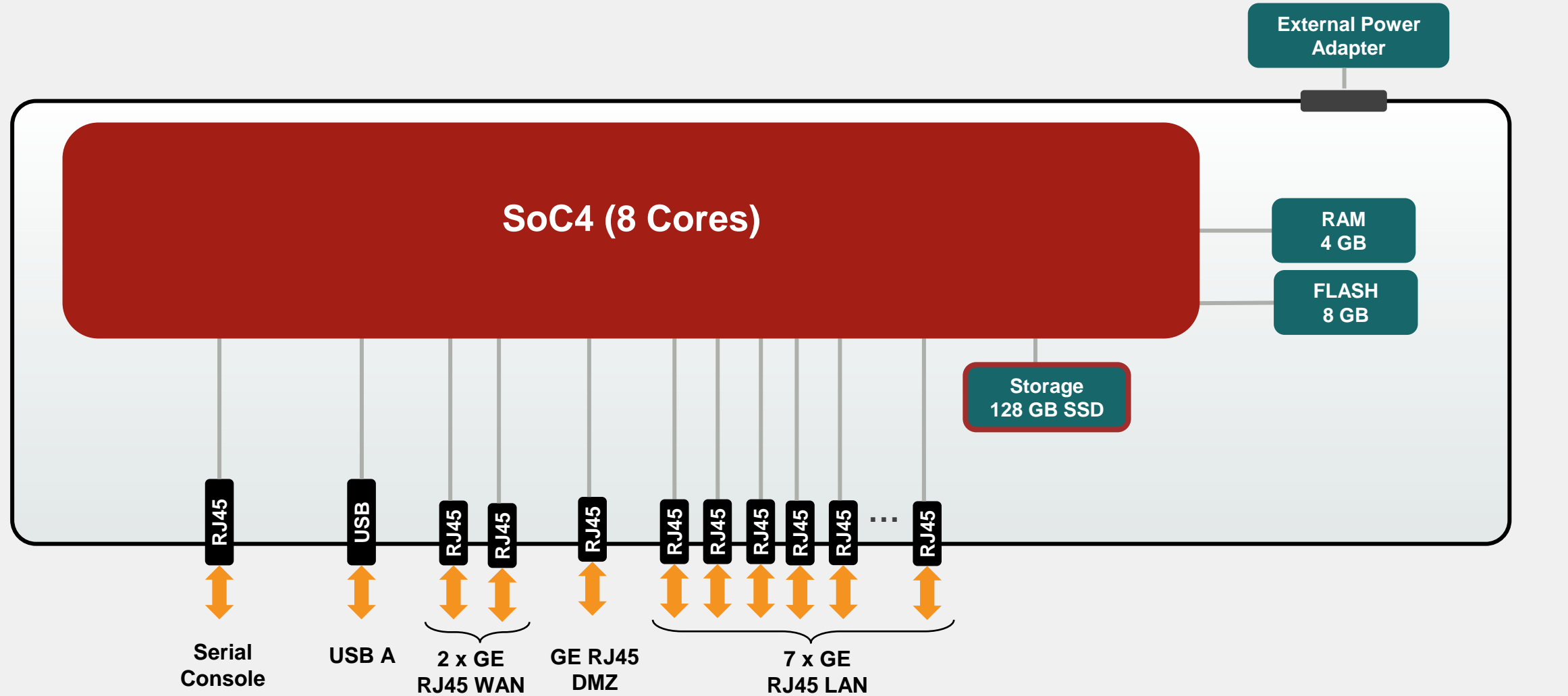
FortiGate Rugged-70F Schematic



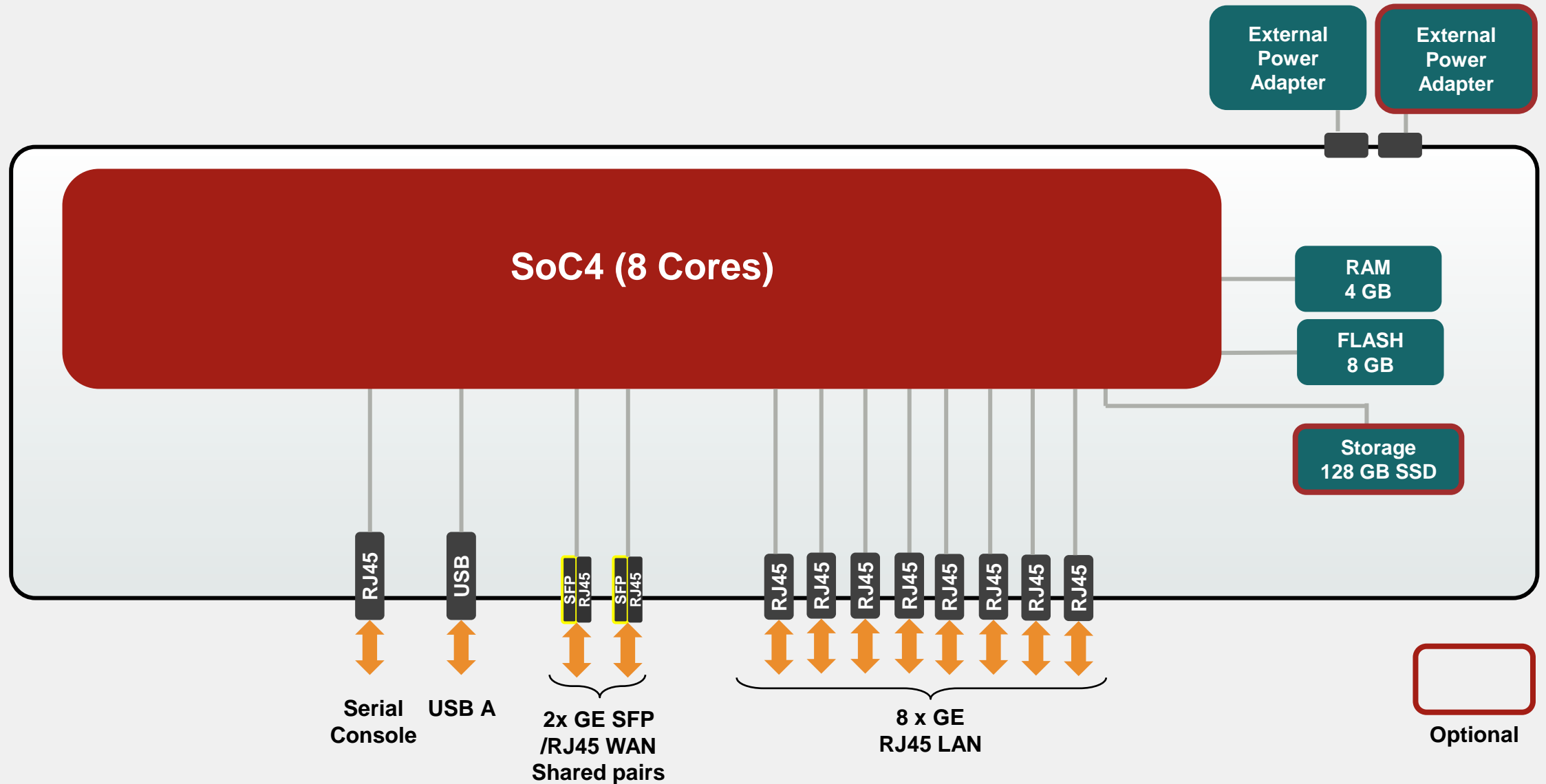
FortiGate Rugged-70F-3G4G Schematic



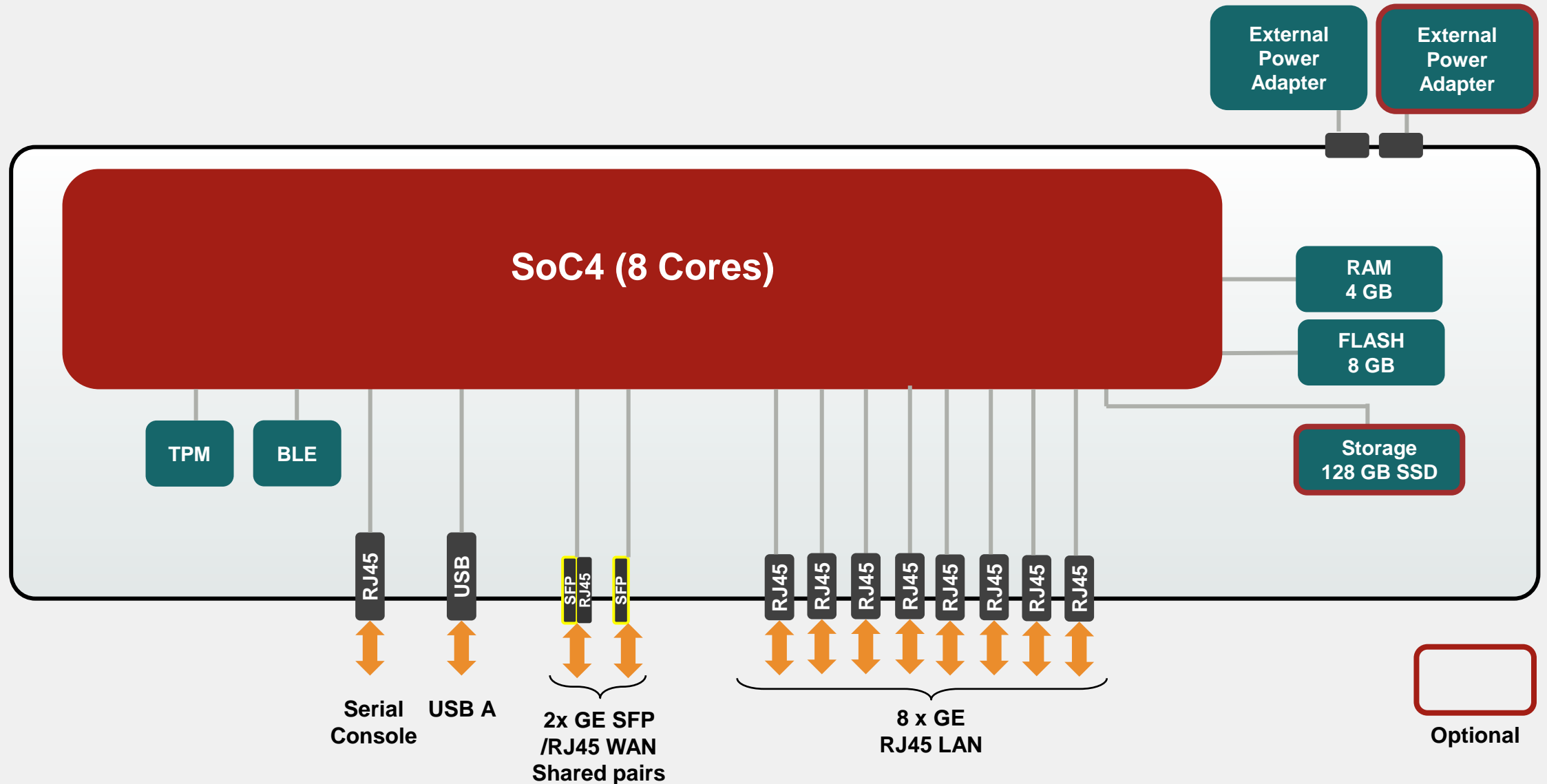
FortiGate 70/71F Schematic



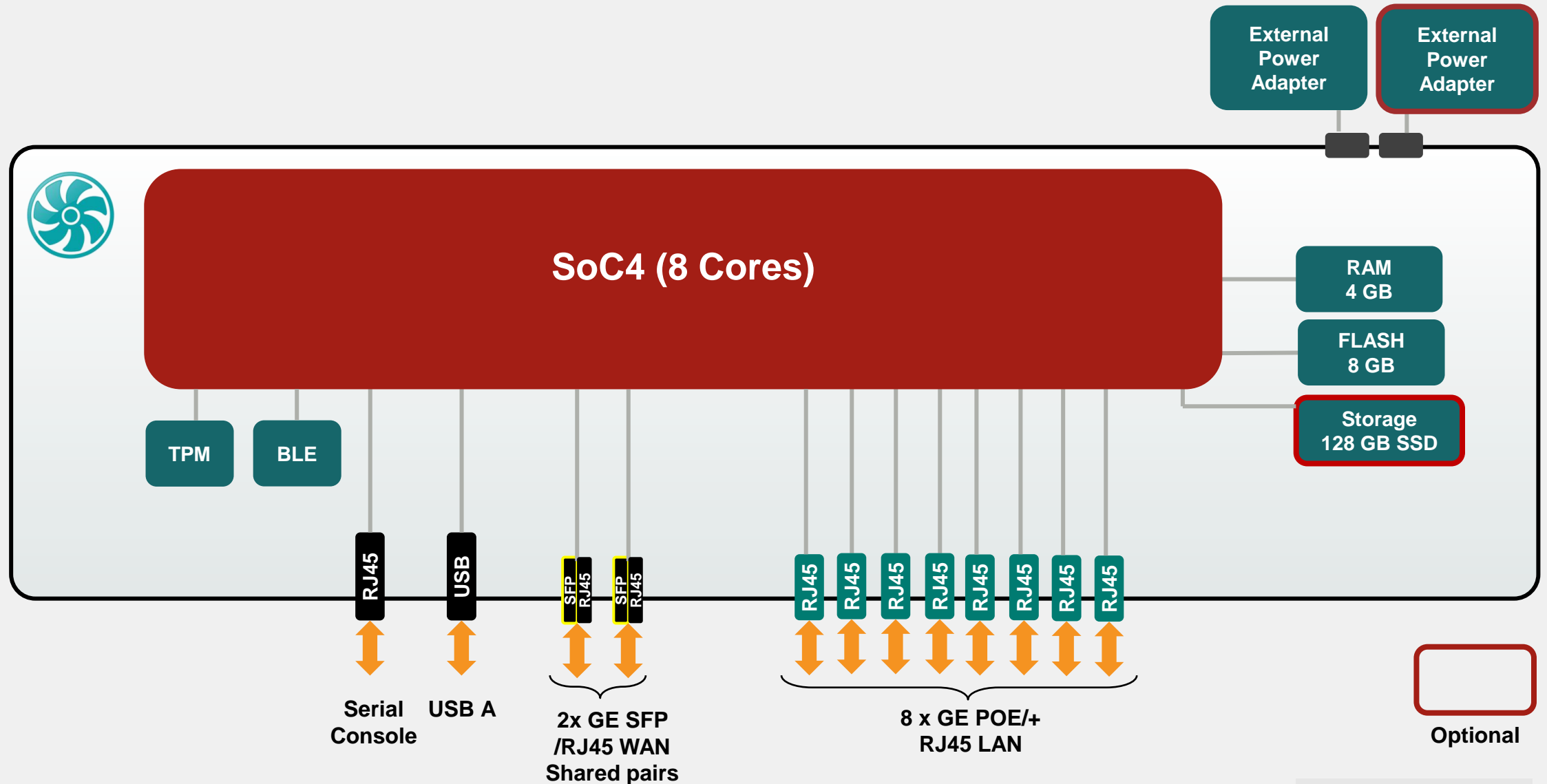
FortiGate 80/81F Schematic



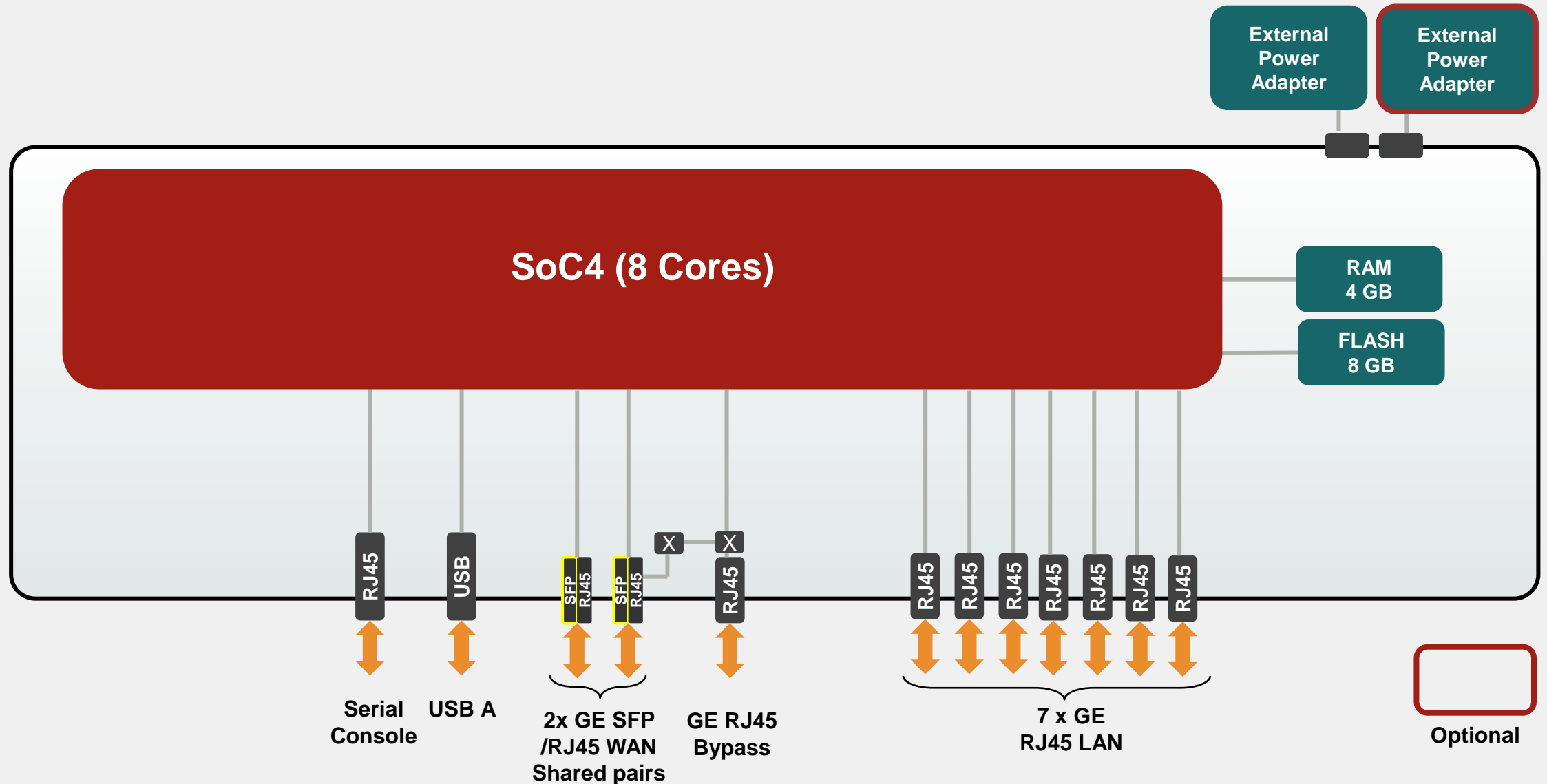
FortiGate 80/81F Gen2 Schematic



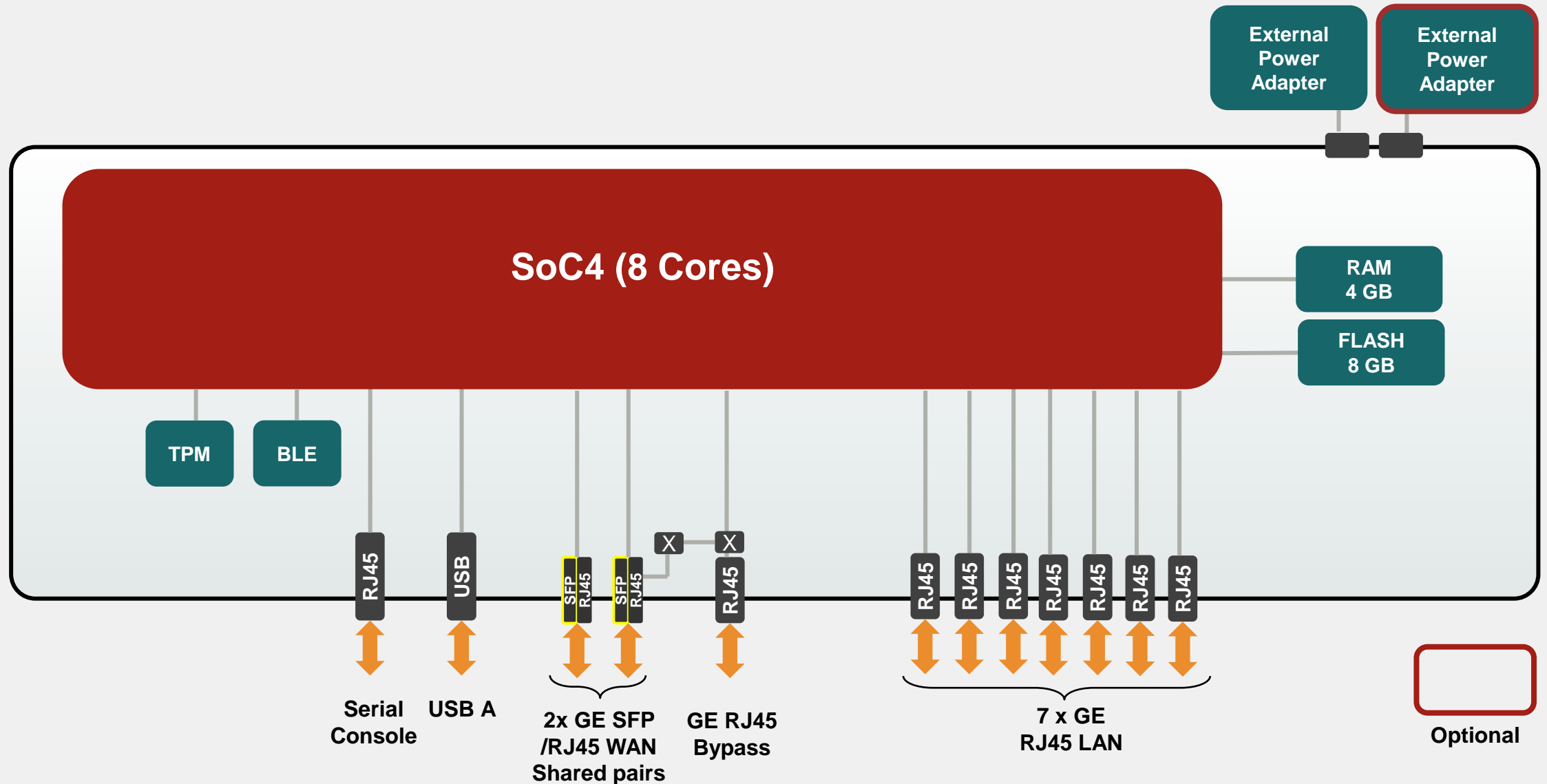
FortiGate 80/81F-POE Schematic



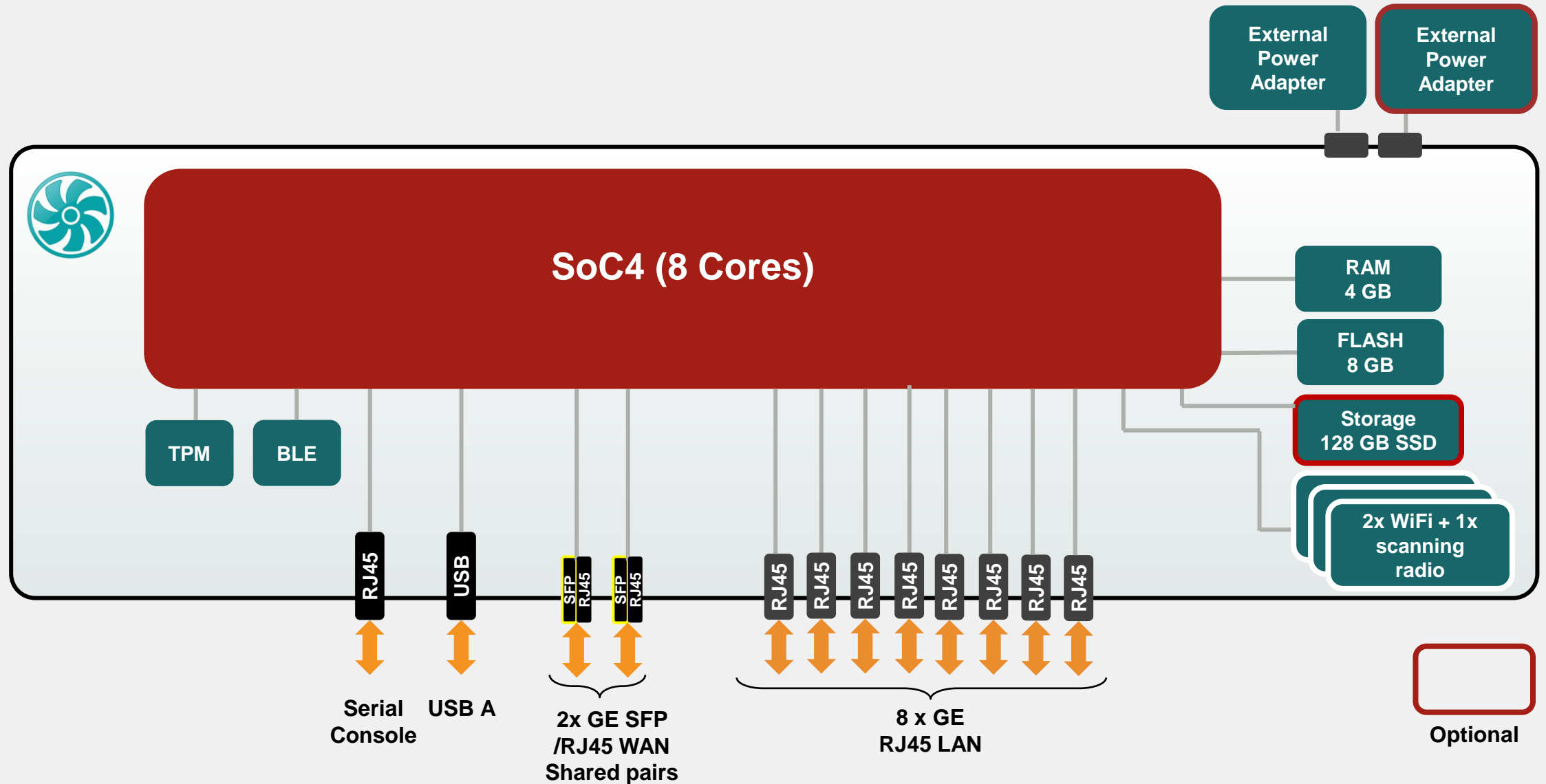
FortiGate 80F-Bypass Schematic



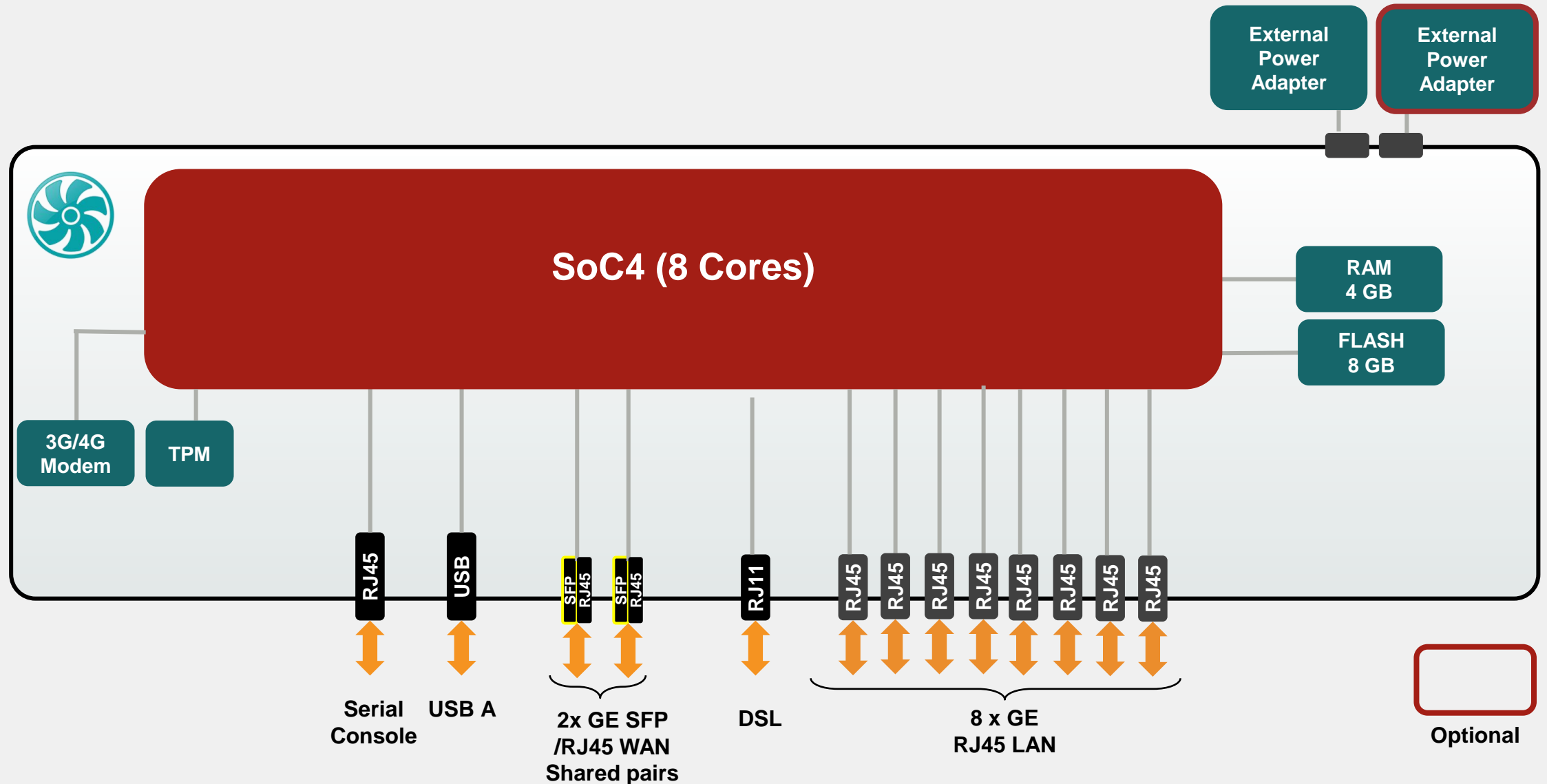
FortiGate 80F-Bypass Gen2 Schematic



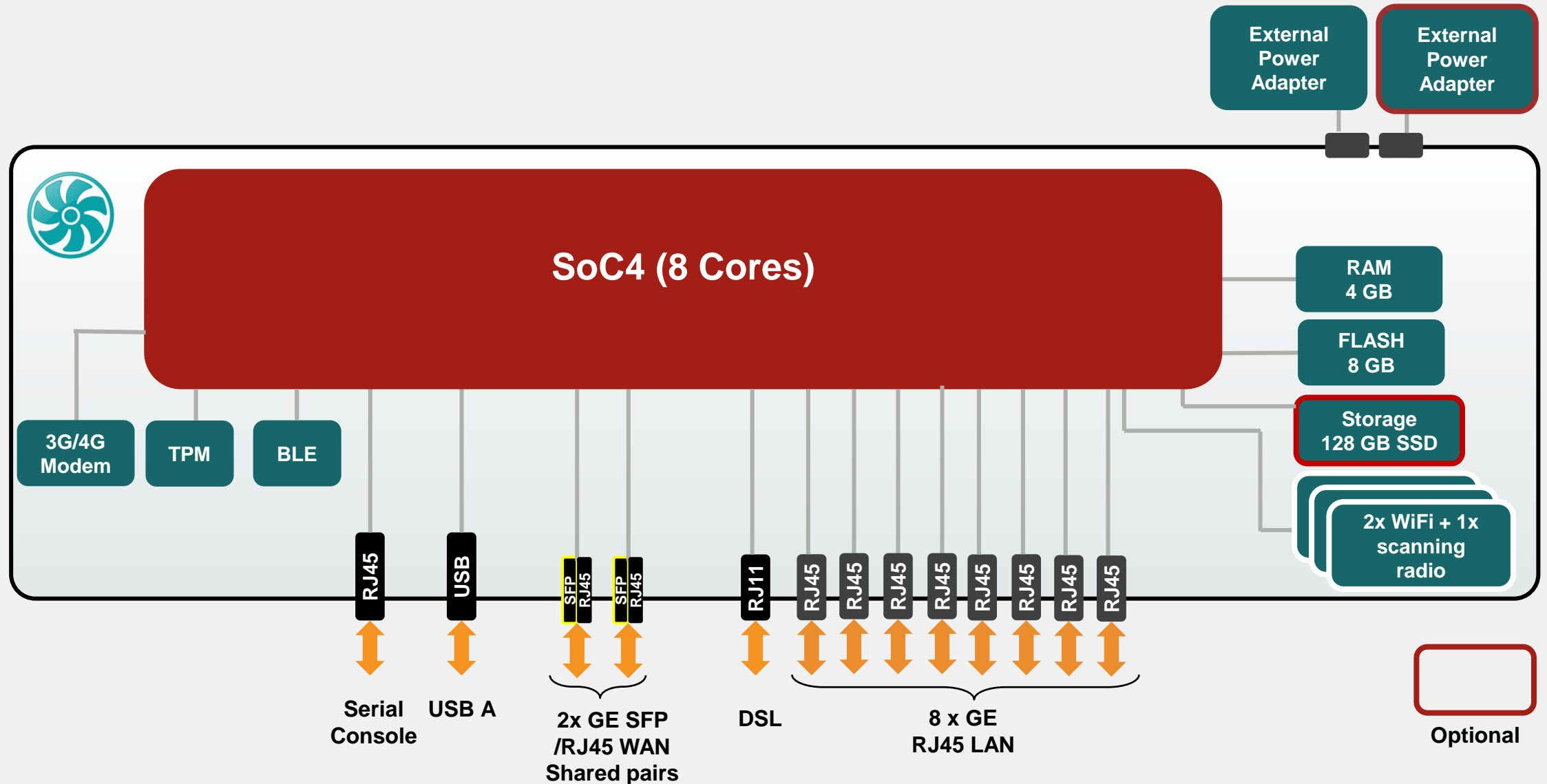
FortiWiFi 80/81F-2R Schematic



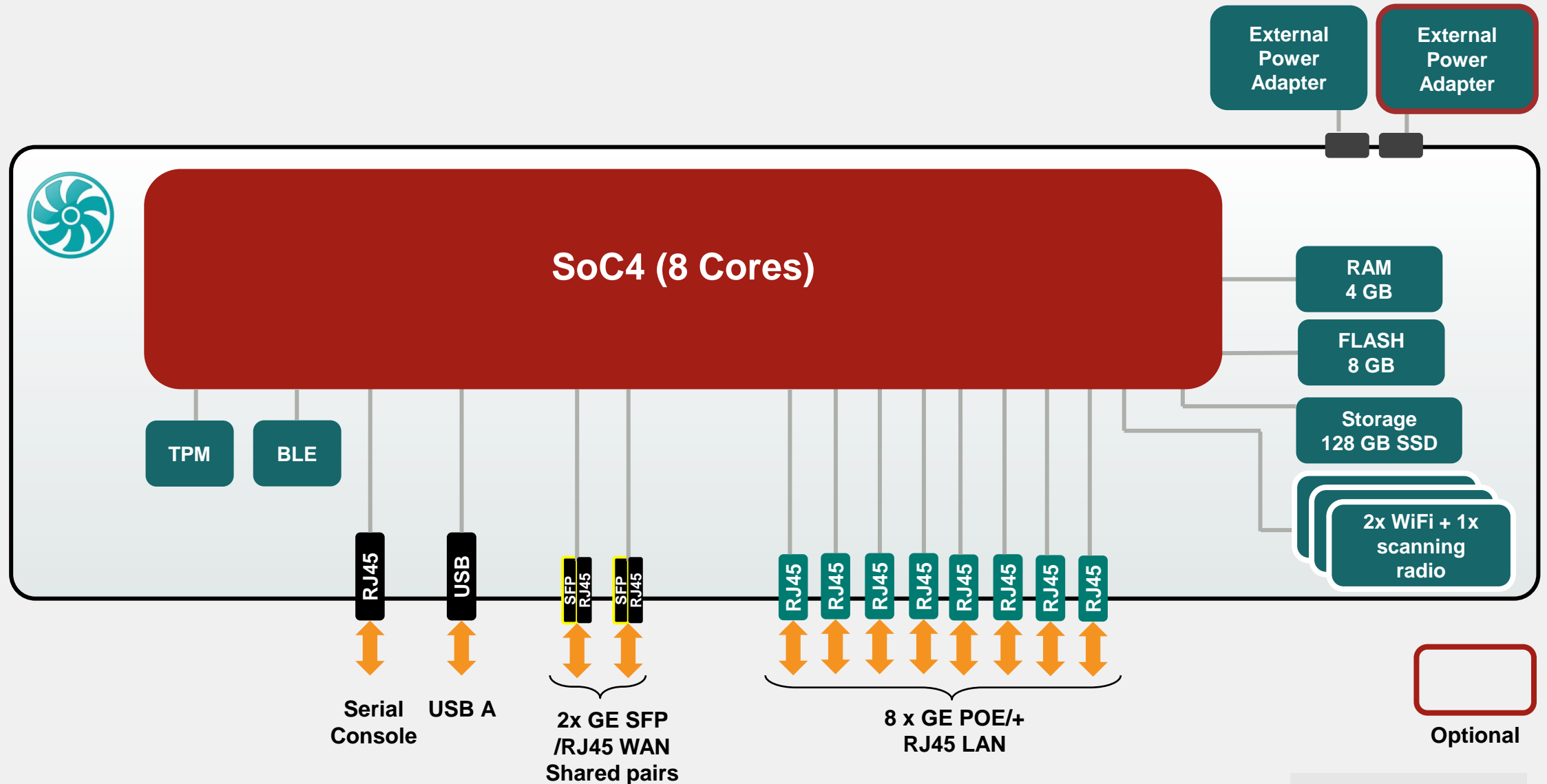
FortiGate 80F-DSL Schematic



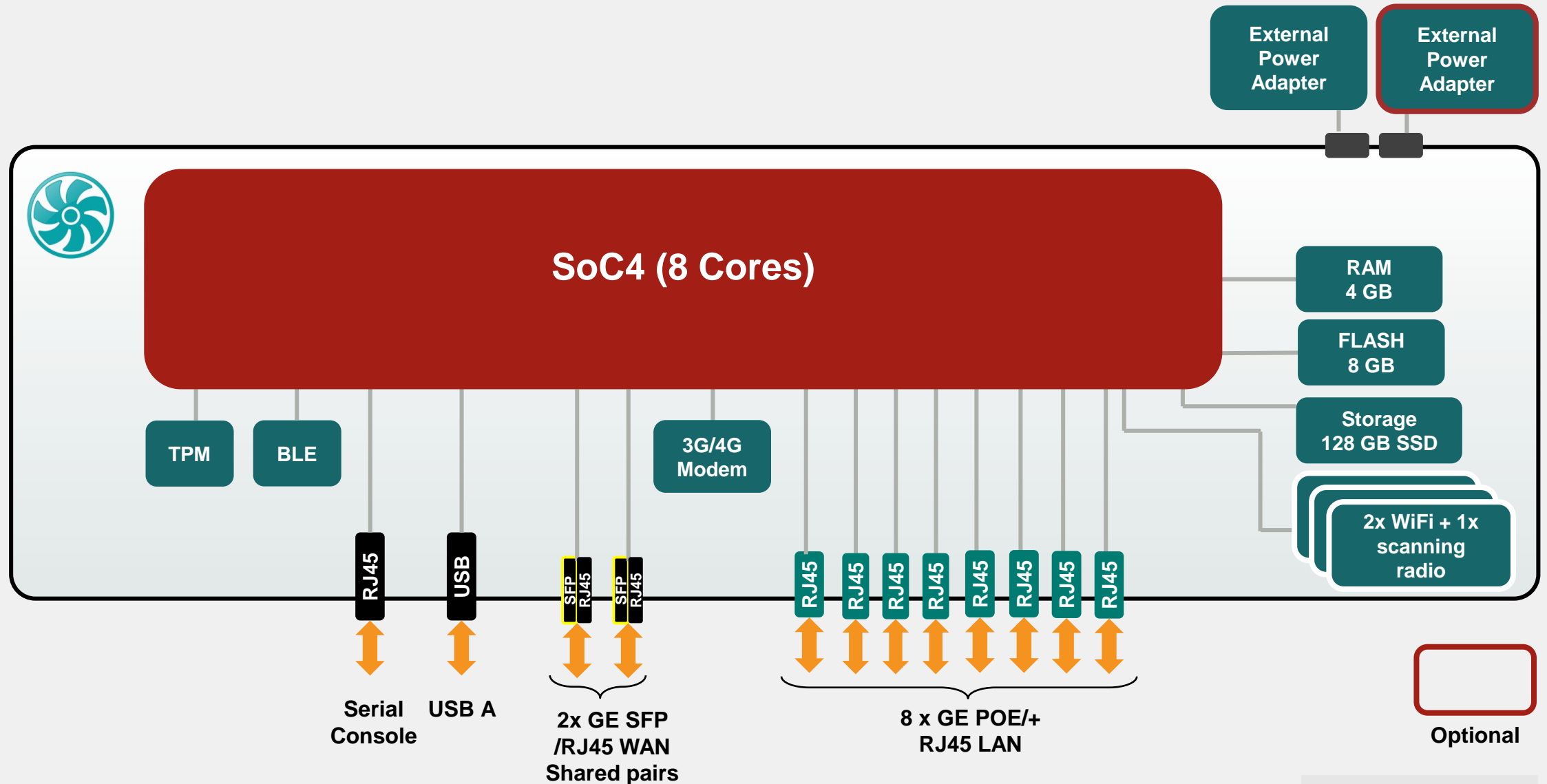
FortiWiFi 80/81F-2R-3G4G-DSL Schematic



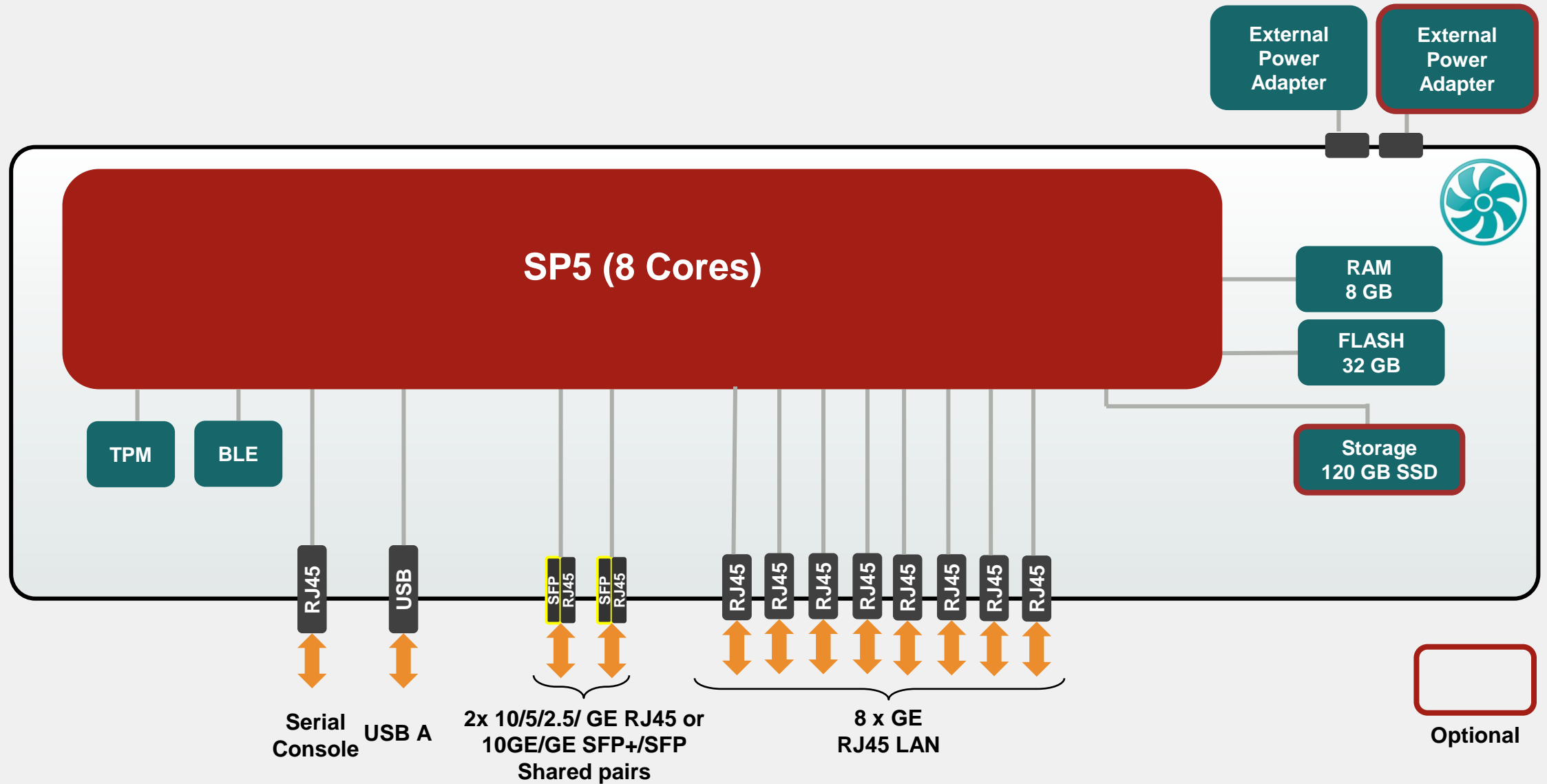
FortiWiFi 81F-2R-POE Schematic



FortiWiFi 81F-2R-3G4G-POE Schematic



FortiGate 90/91G Schematic

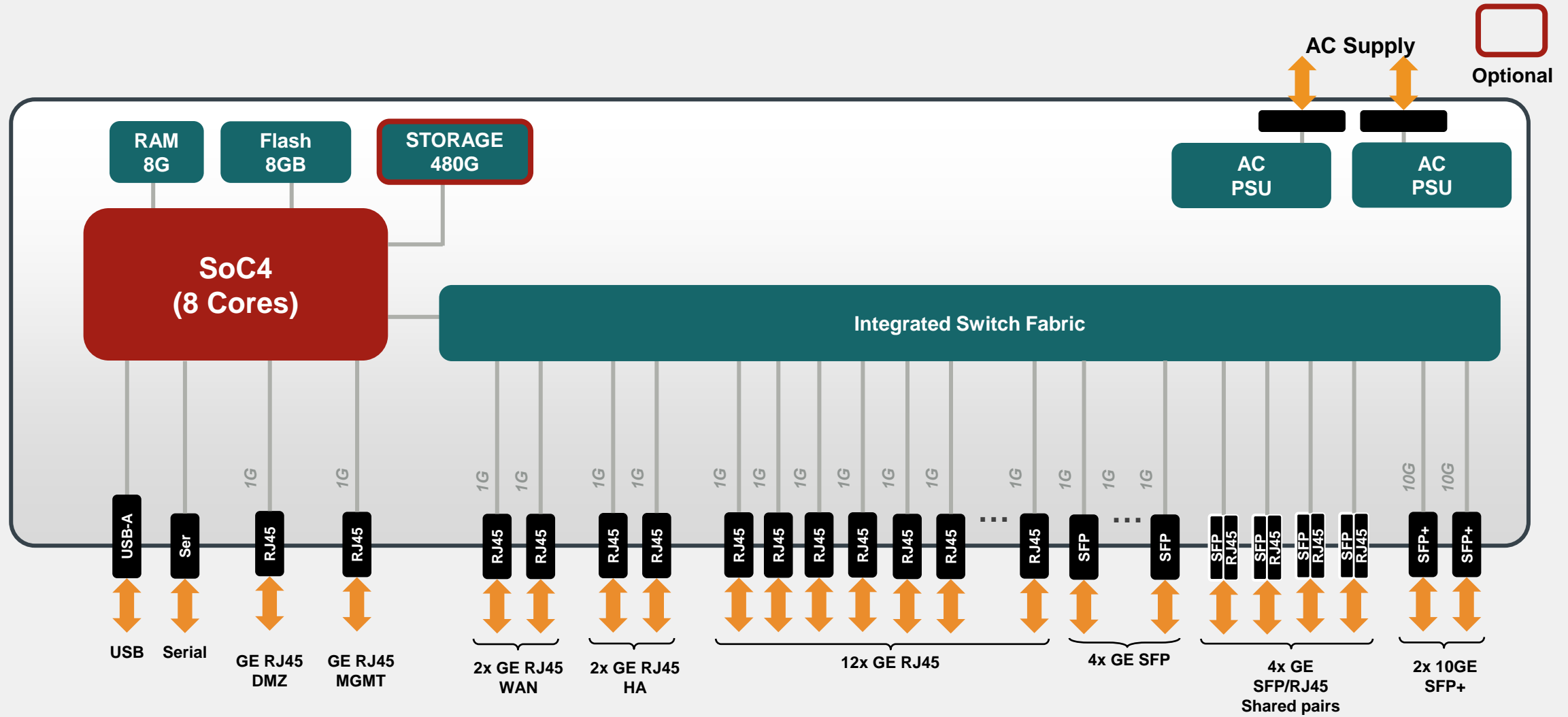




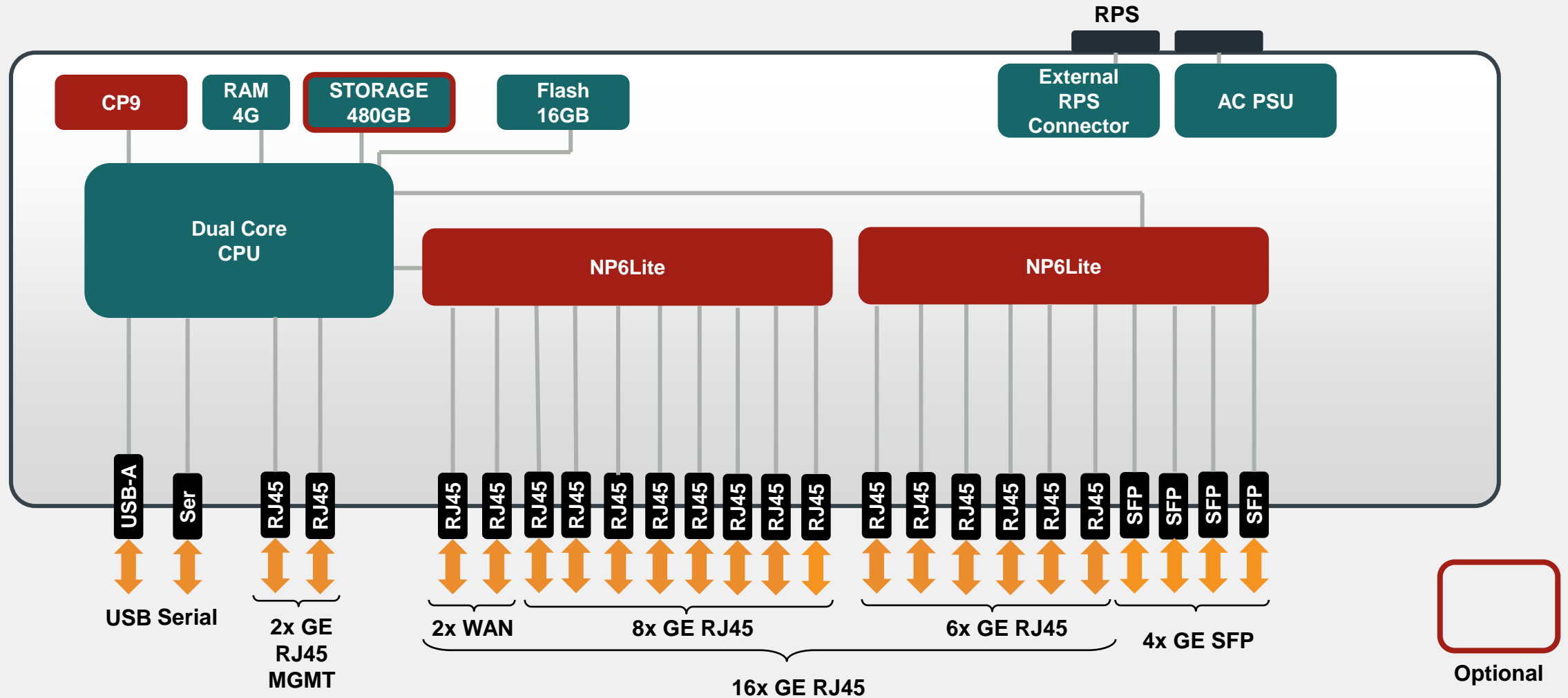
FortiGate – Mid-Range



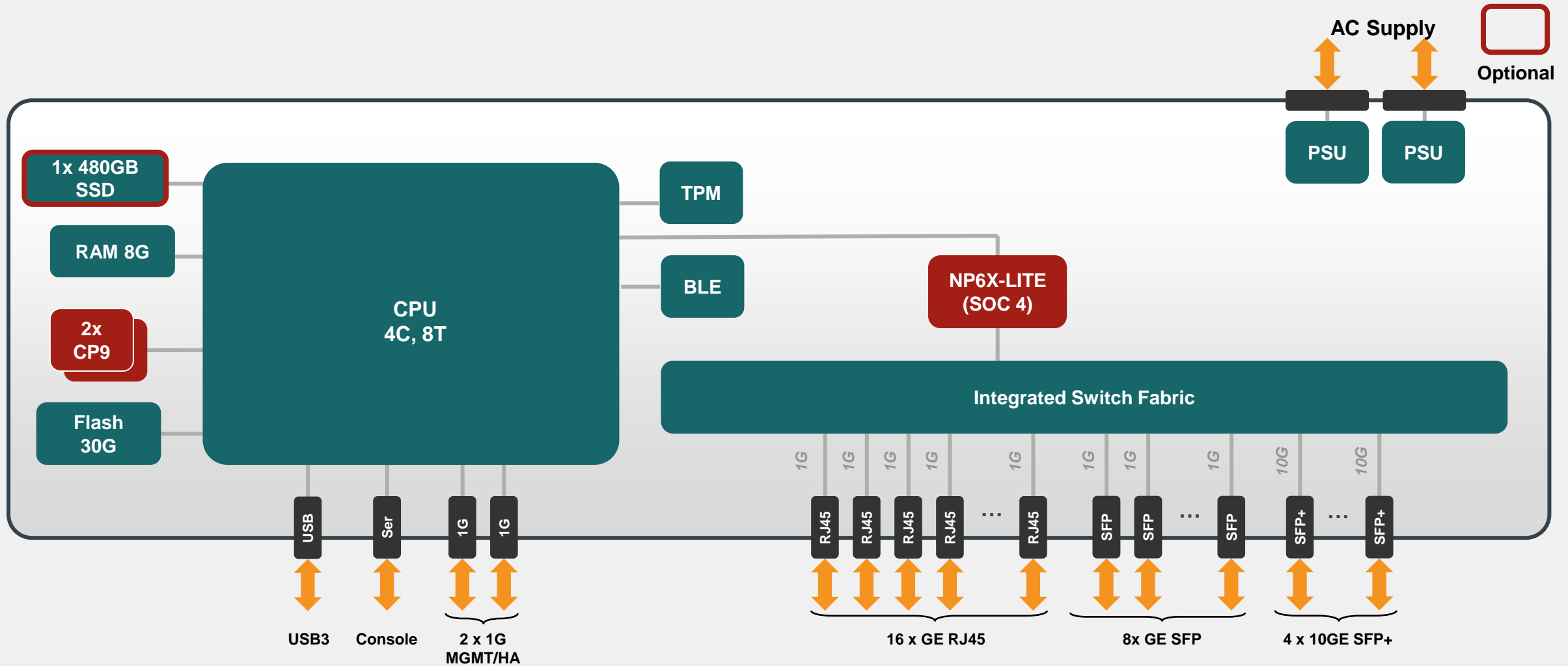
FortiGate 100/101F Gen2 Schematic



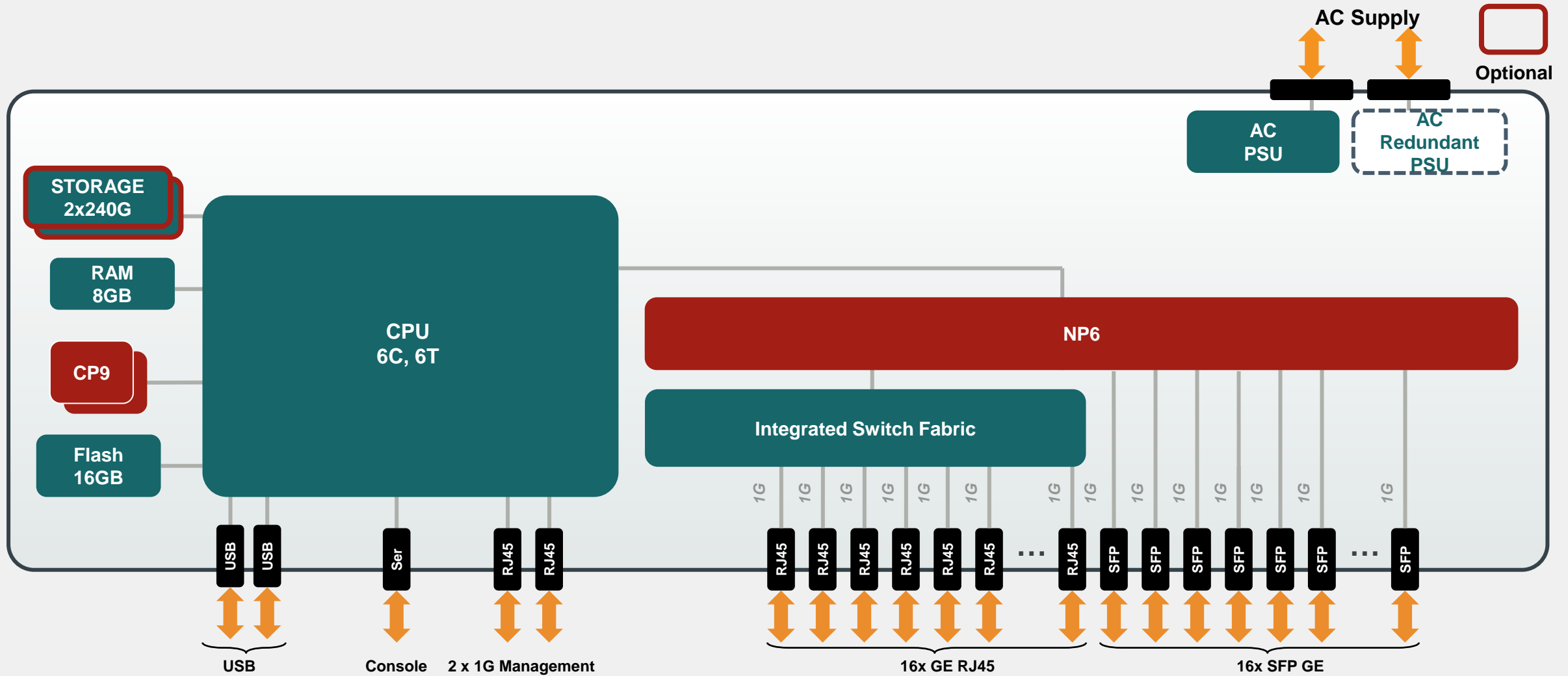
FortiGate 200/201E Schematic



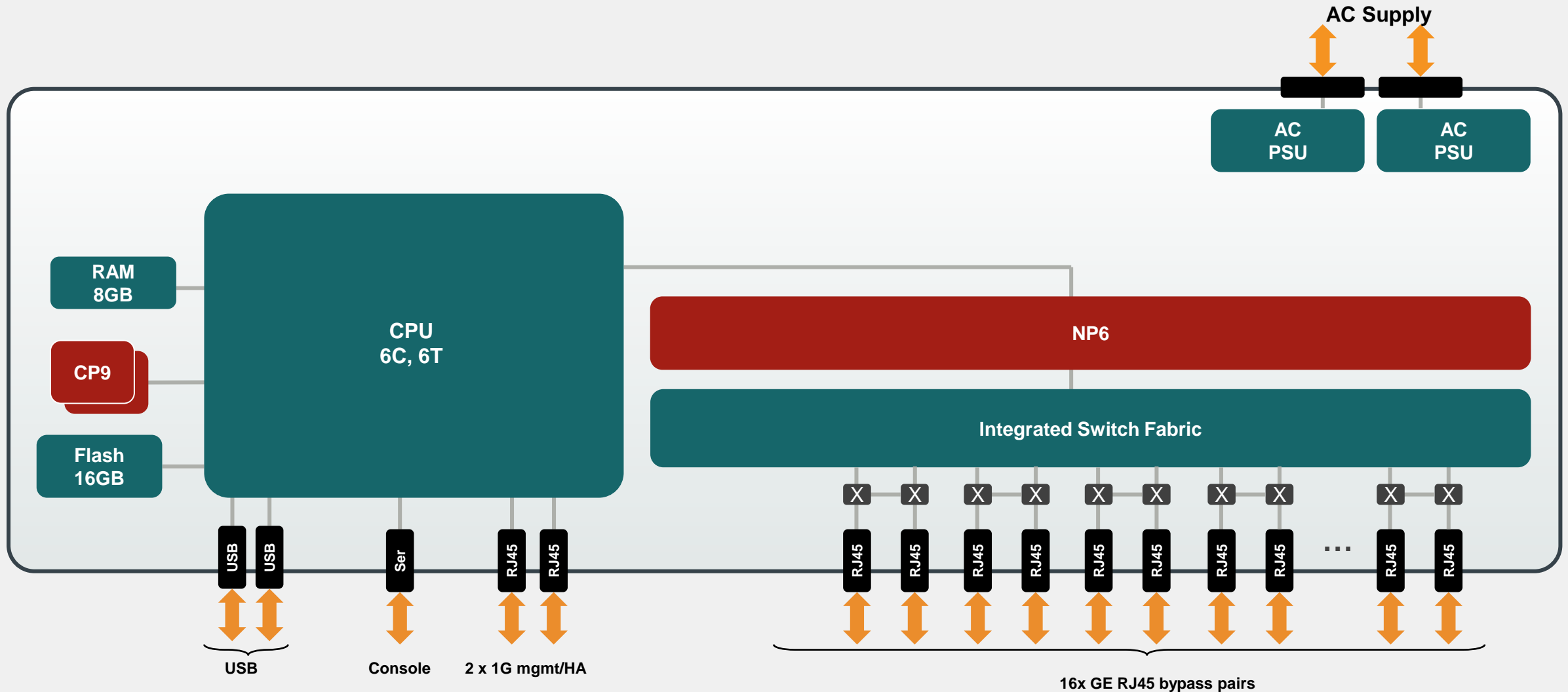
FortiGate 200/201F Schematic



FortiGate 400/401E Schematic

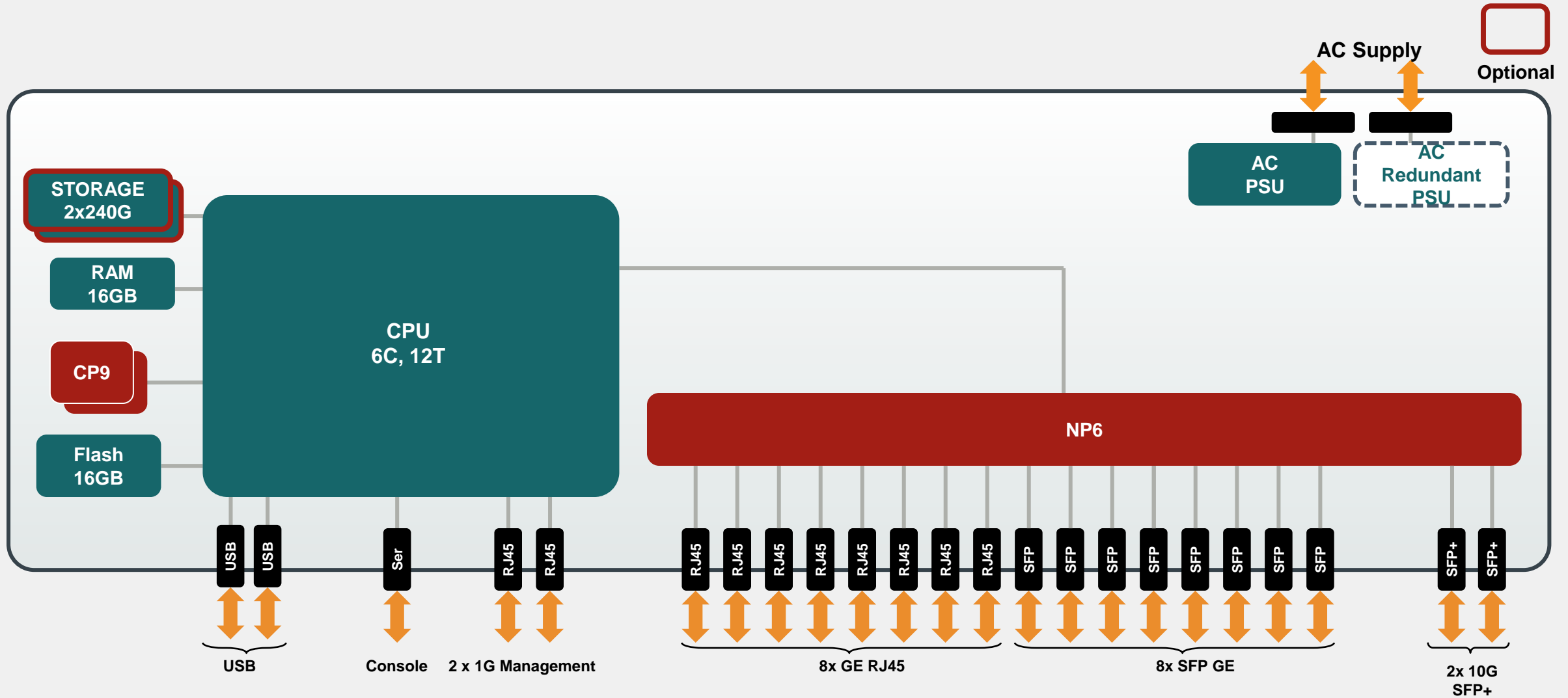


FortiGate 400E-Bypass Schematic

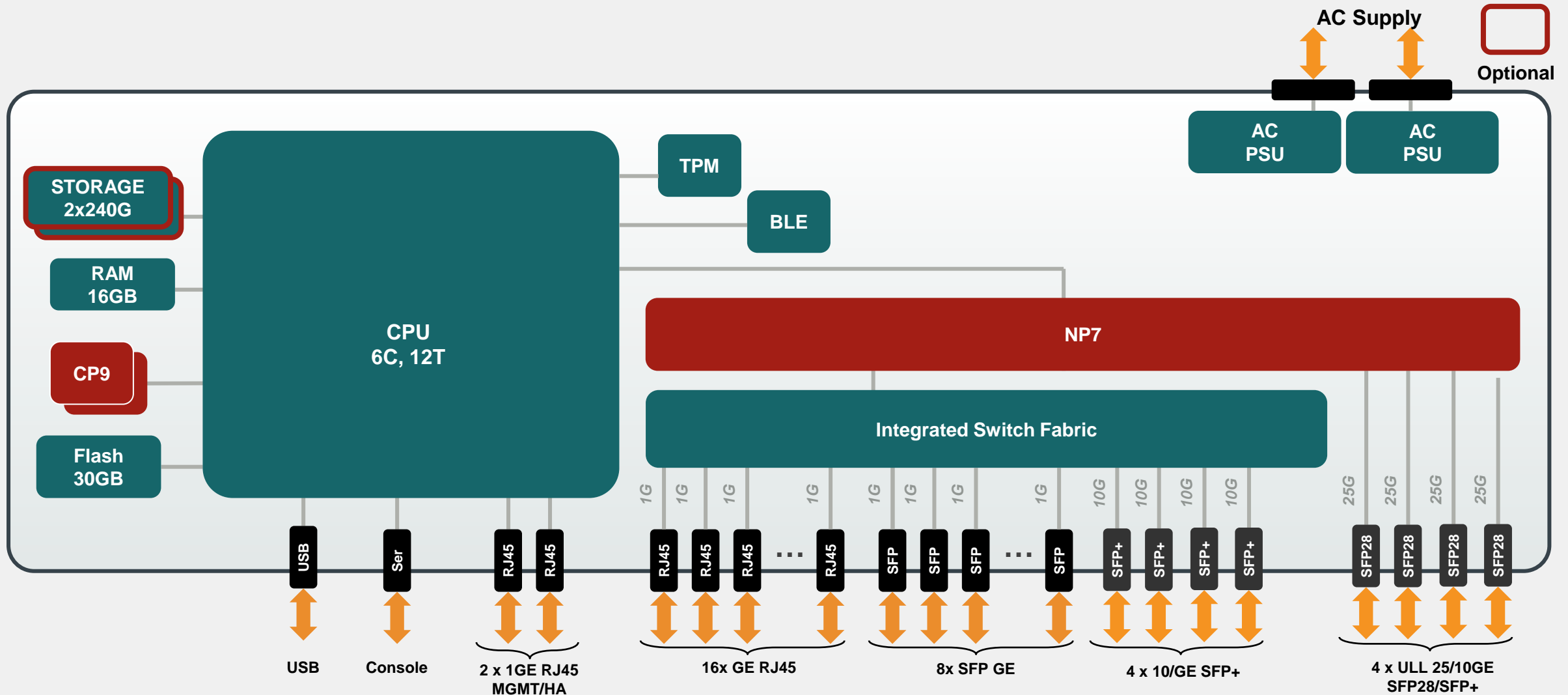




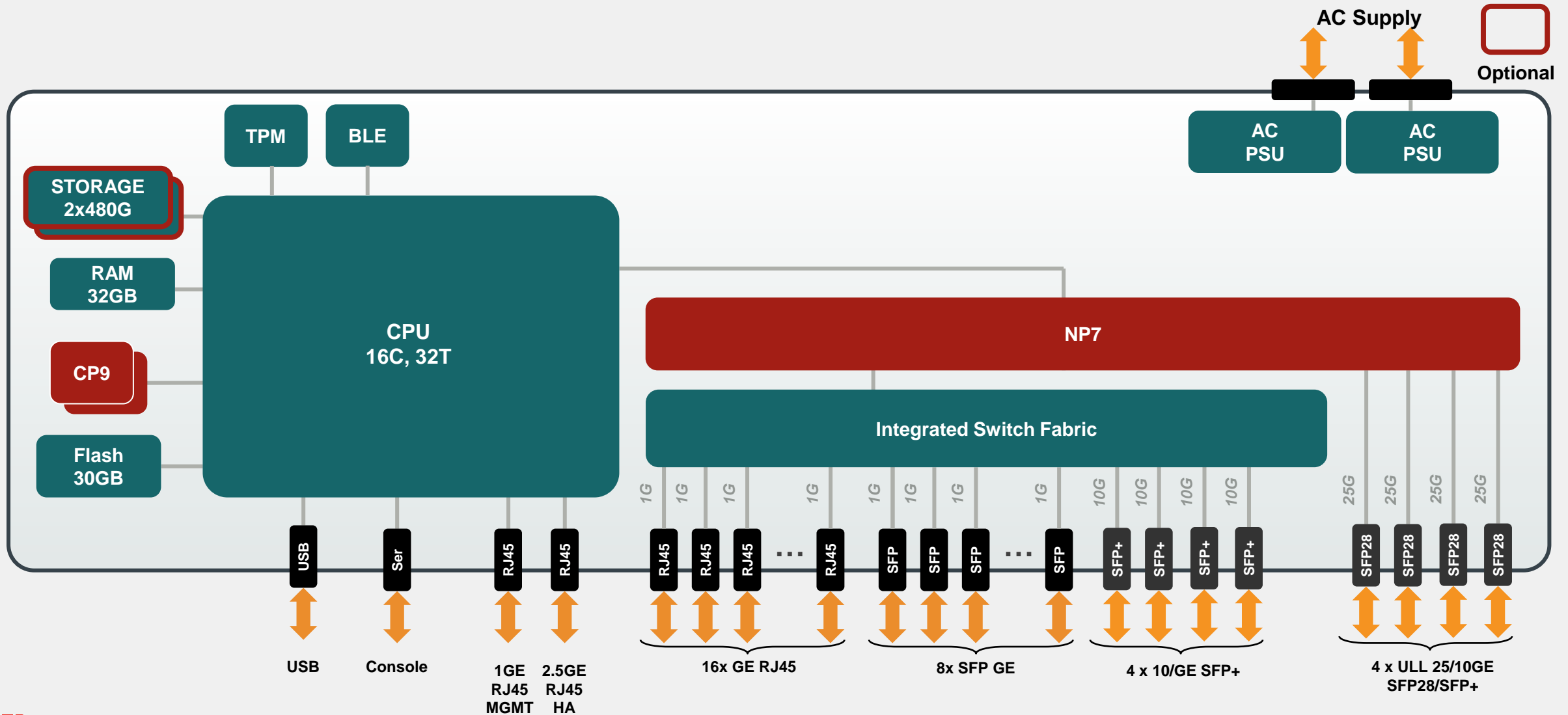
FortiGate 600/601E Schematic




FortiGate 600/601F Schematic






FortiGate 900/901G Schematic

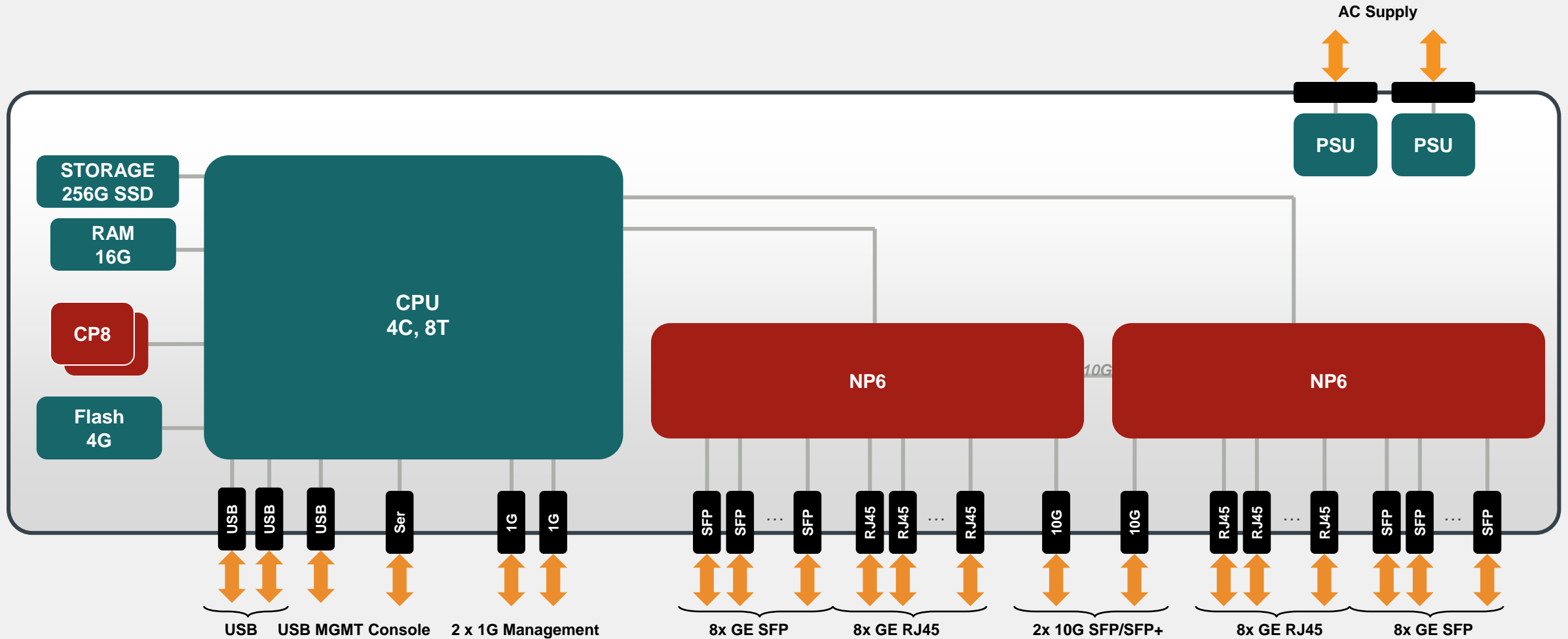




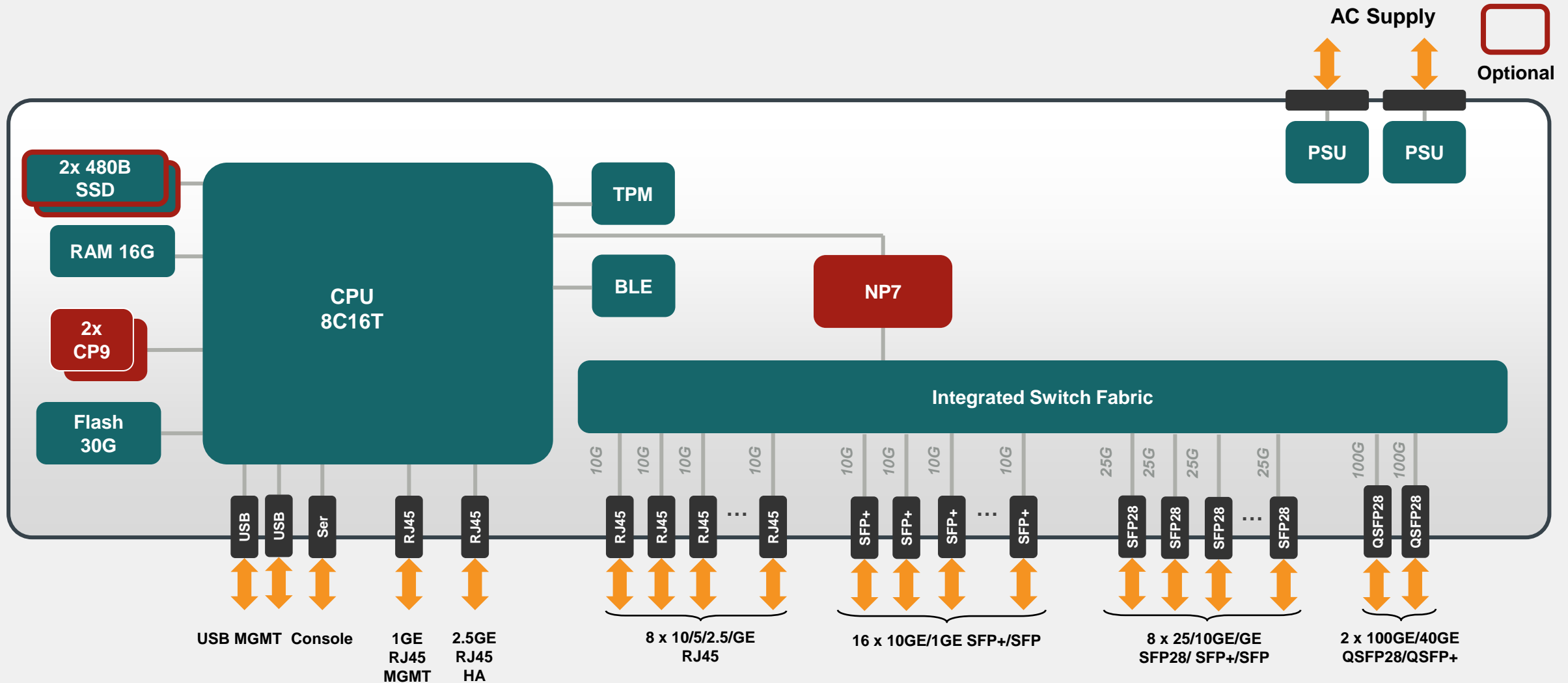
FortiGate – High End



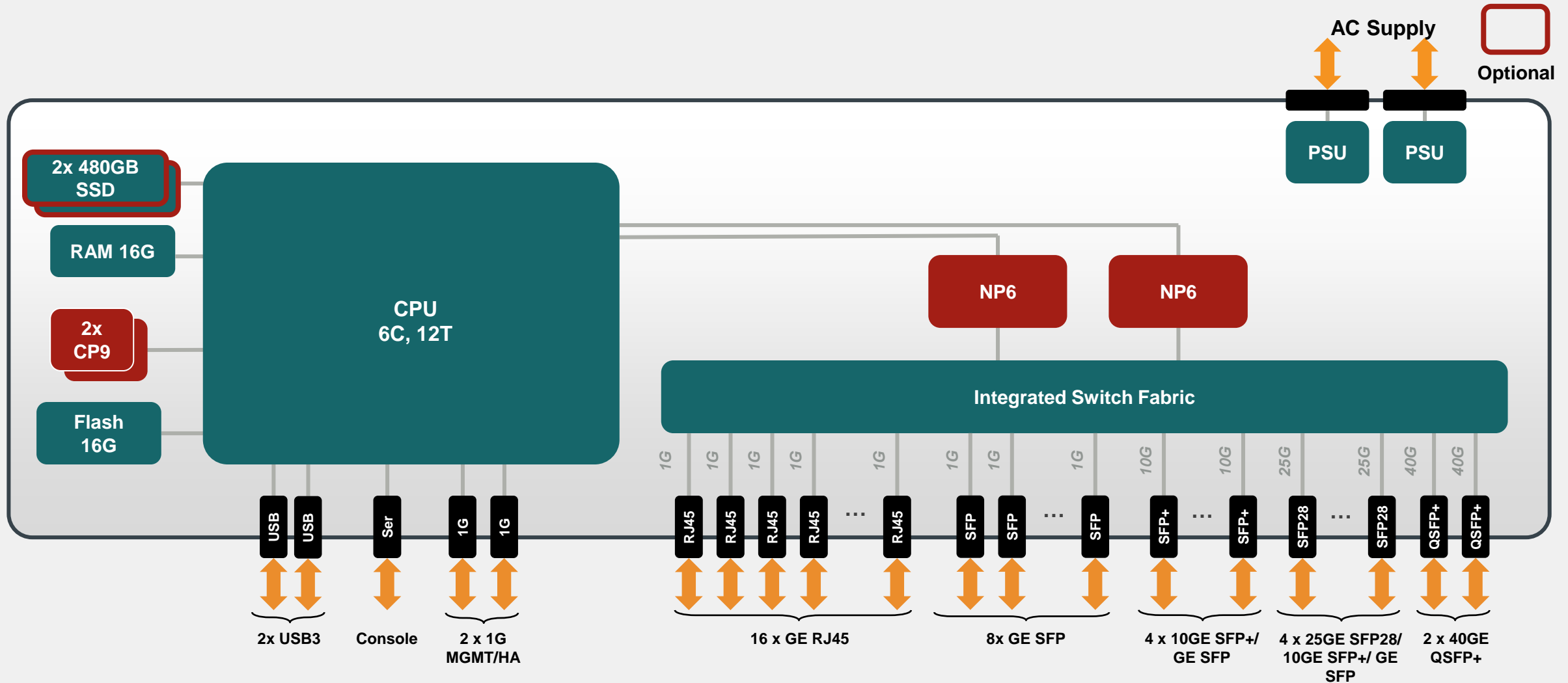
FortiGate 1000D Gen2 Schematic



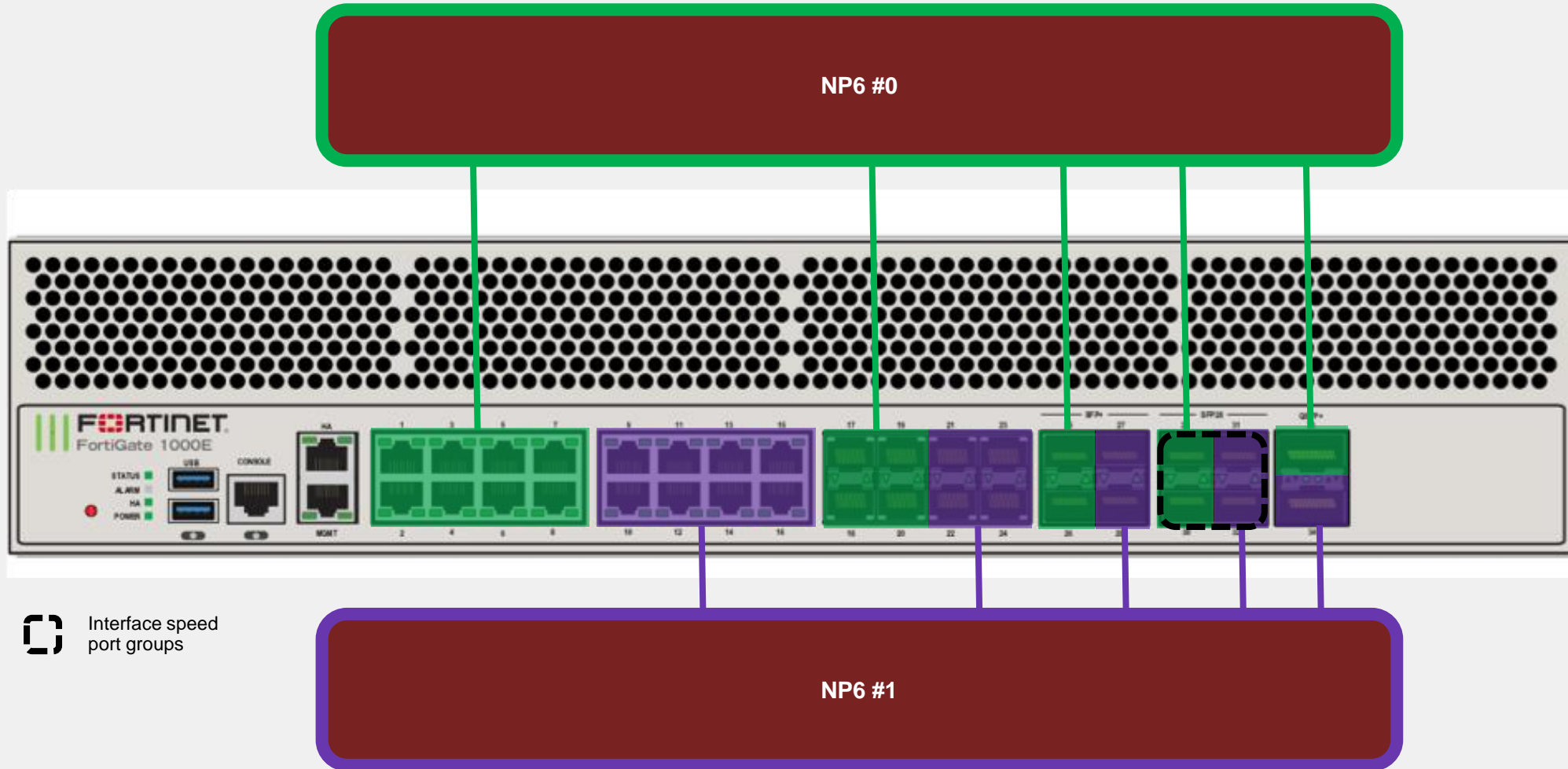
FortiGate 1000/1001F Schematic



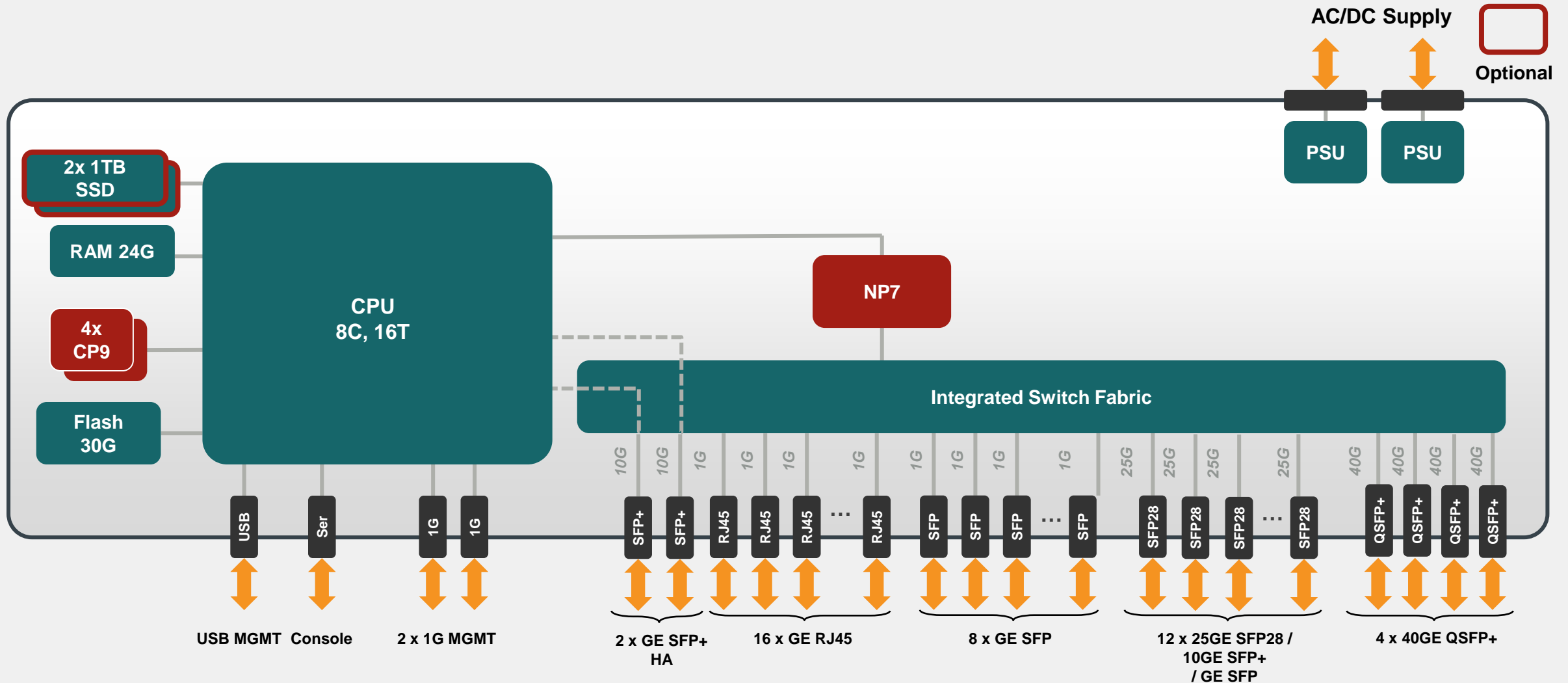
FortiGate 1100/1101E Schematic



FortiGate 1100/1101E Port Mapping



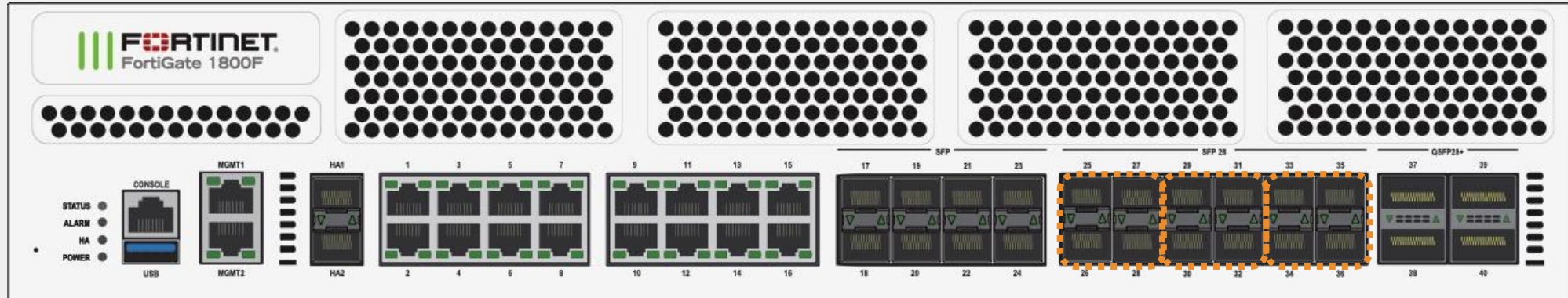
FortiGate 1800/1801F/-DC Schematic




100%

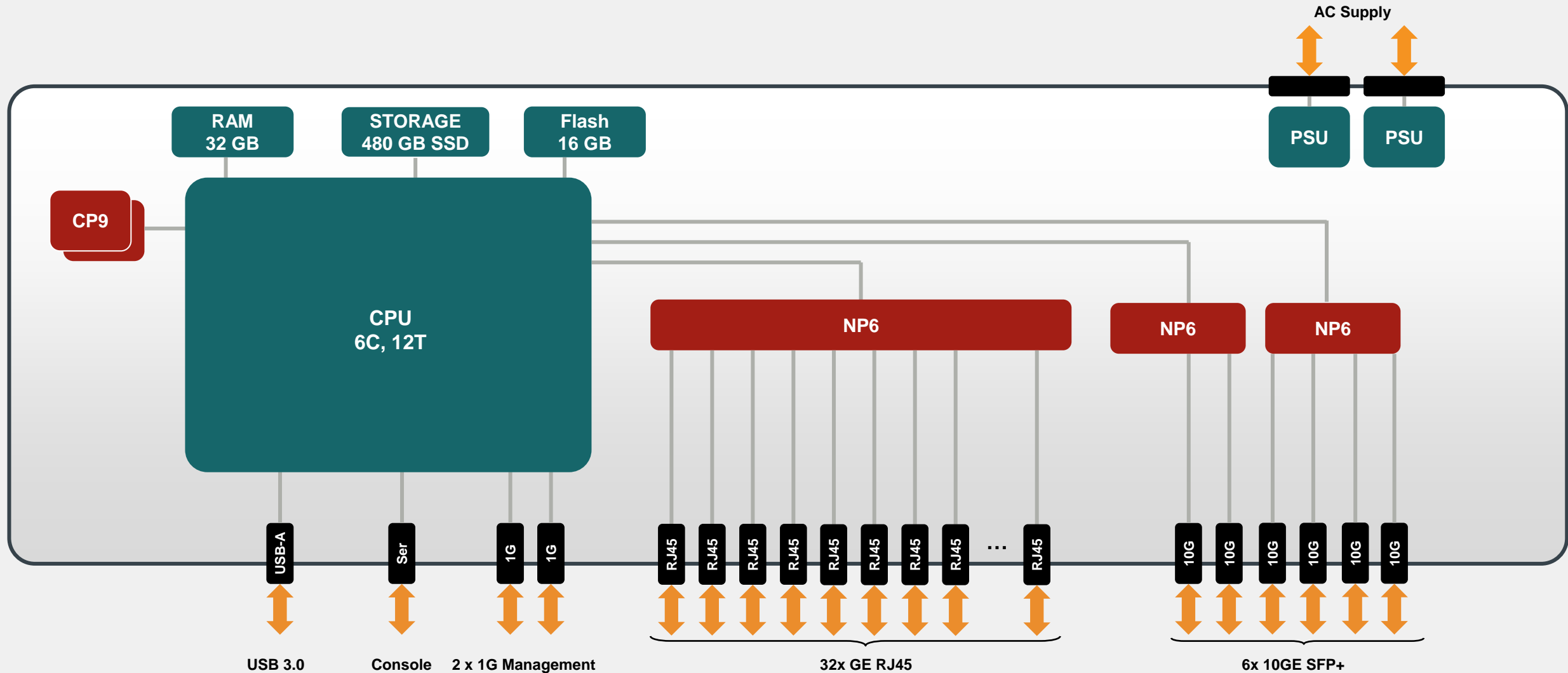


FortiGate 1800/1801F Port Mapping

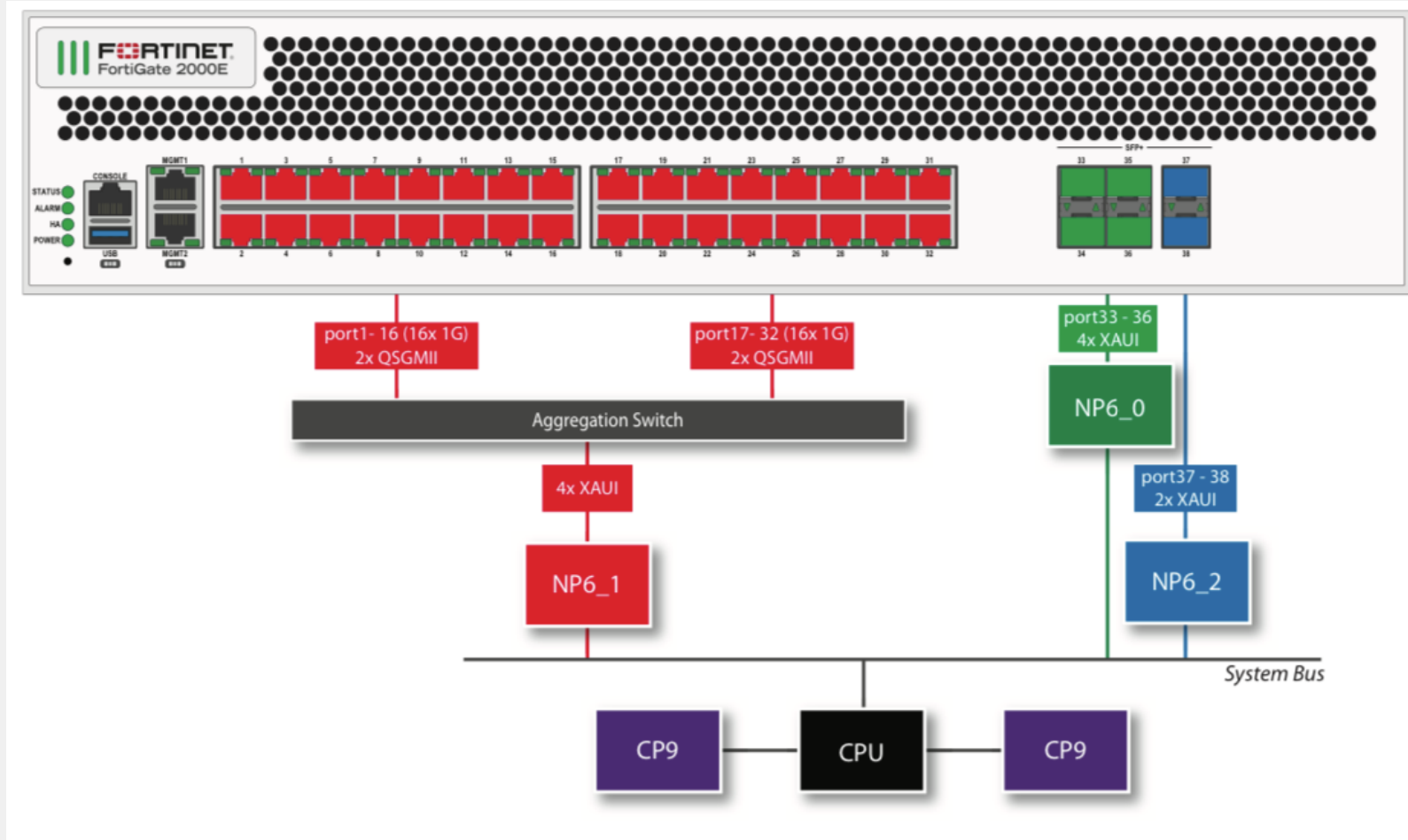


 Interface speed port groups

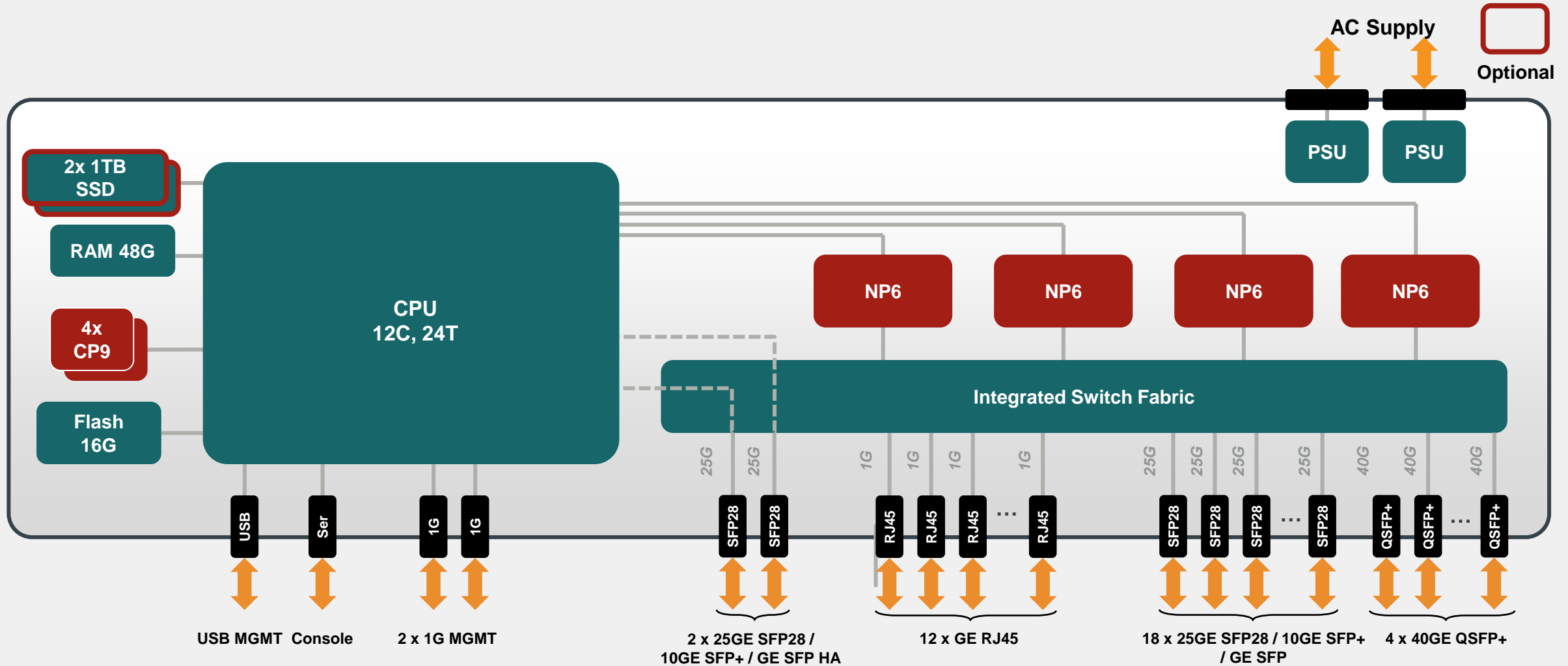
FortiGate 2000E Schematic



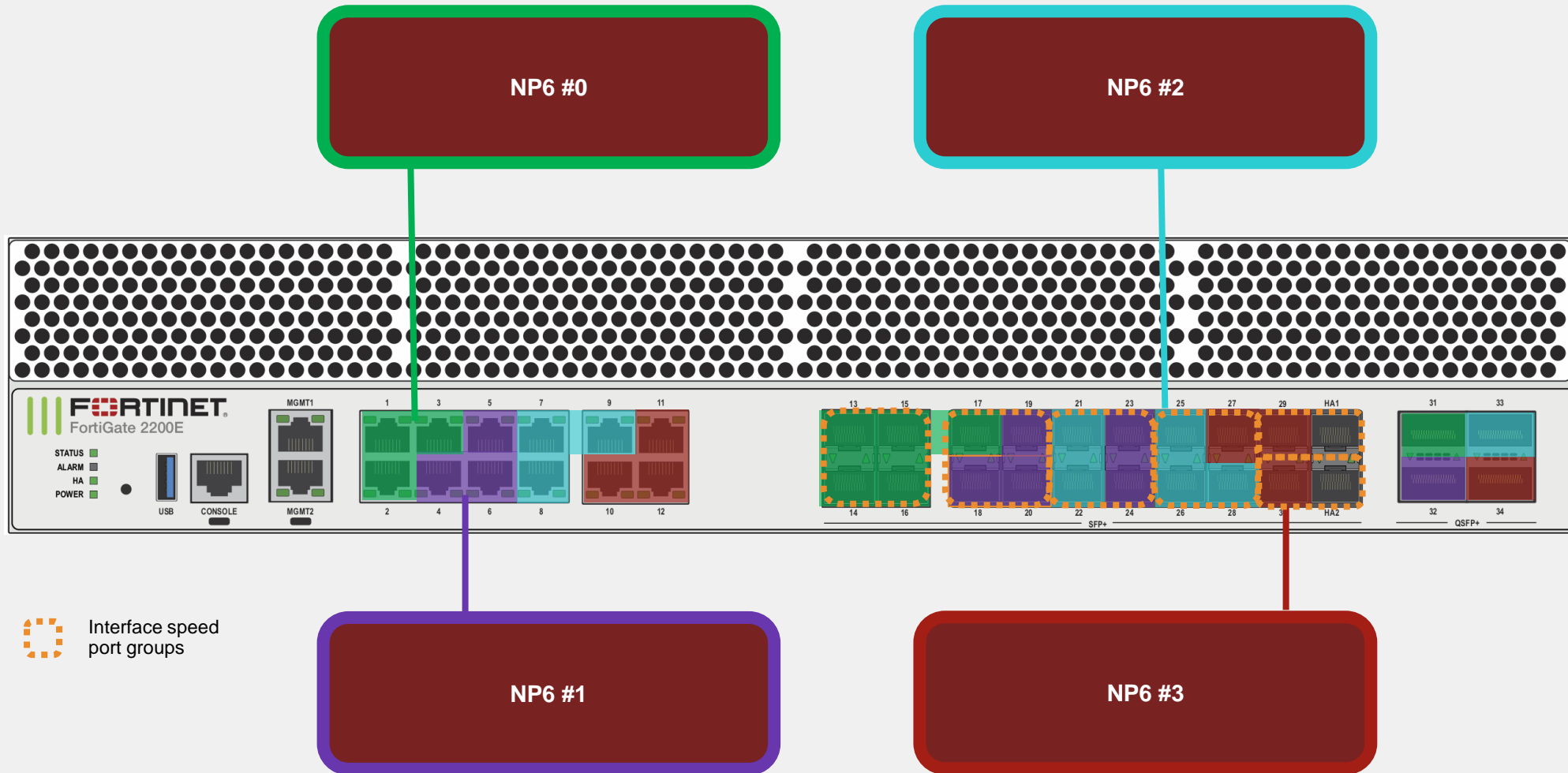
FortiGate 2000E Port Mapping



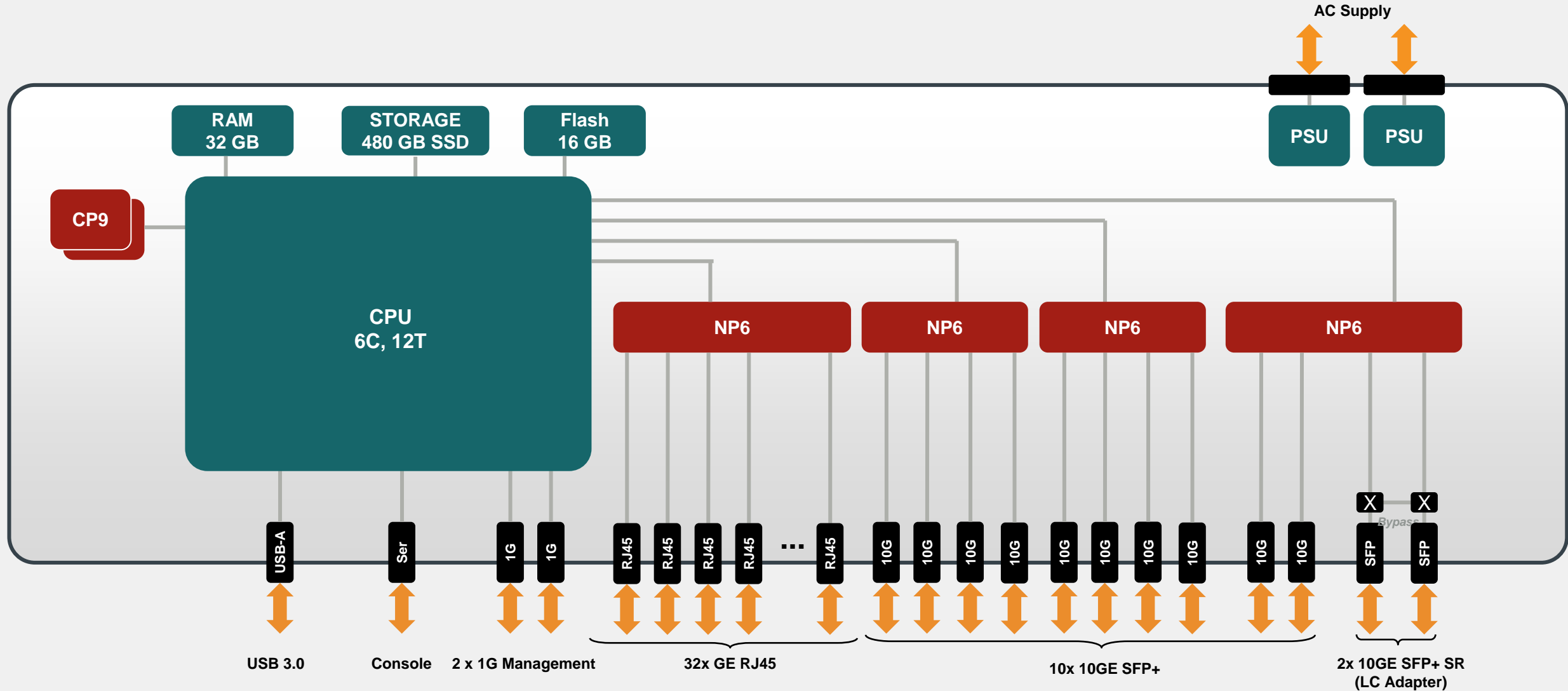
FortiGate 2200/2201E Schematic



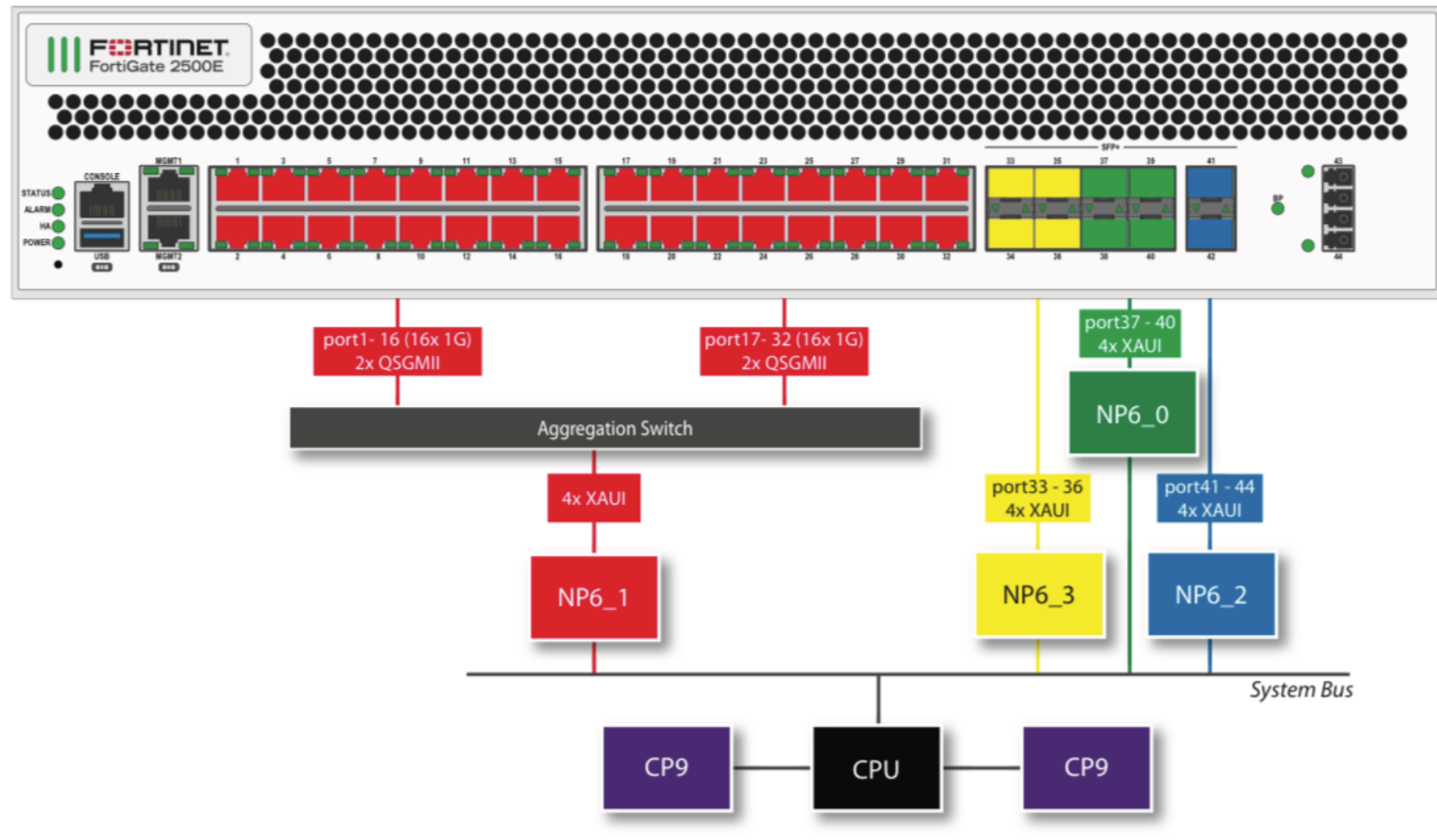
FortiGate 2200/2201E Port Mapping



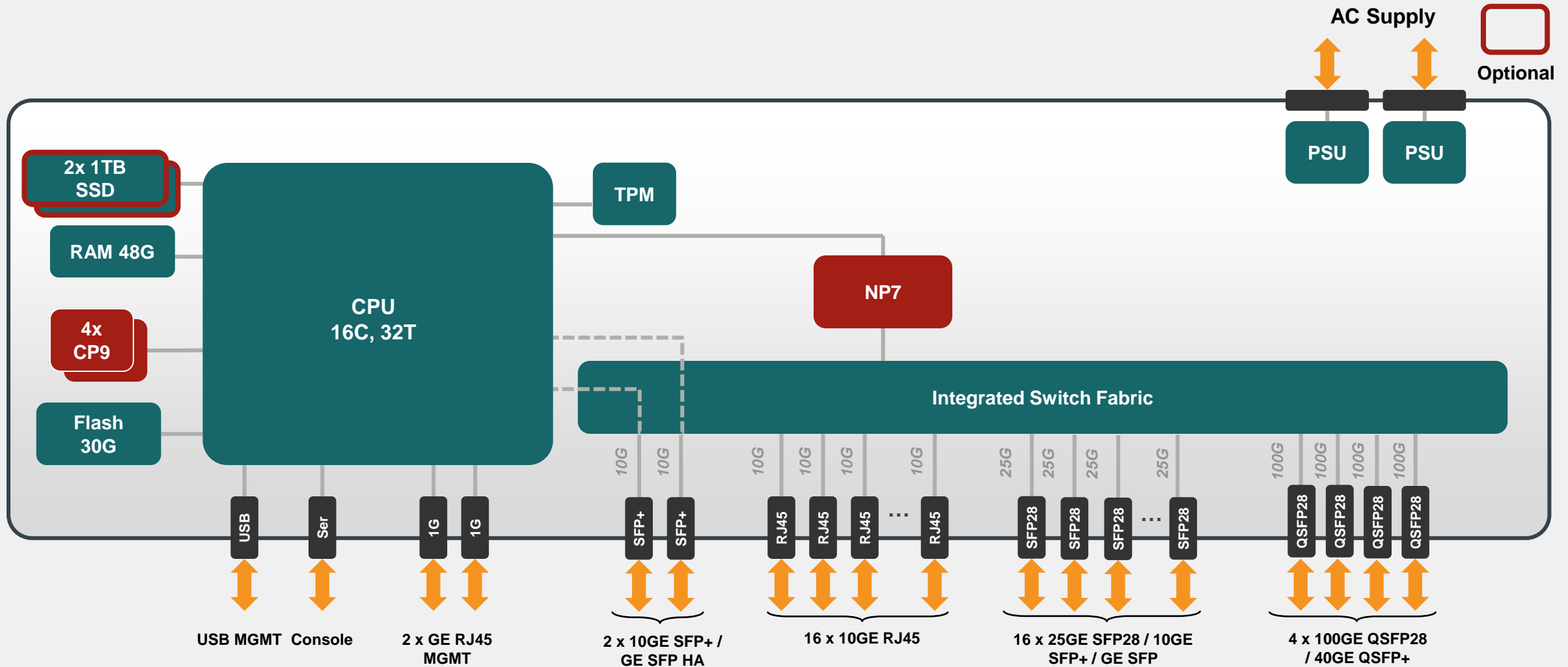
FortiGate 2500E Schematic



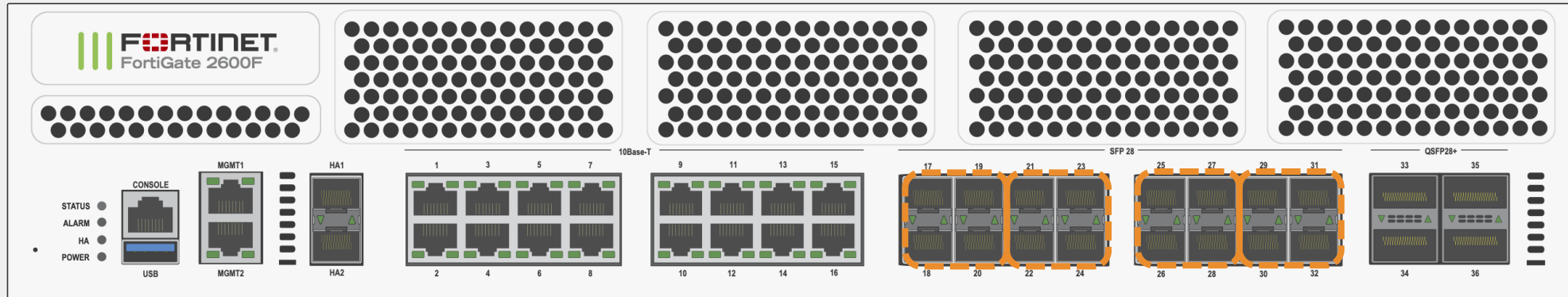
FortiGate 2500E Port Mapping




FortiGate 2600/2601F Schematic

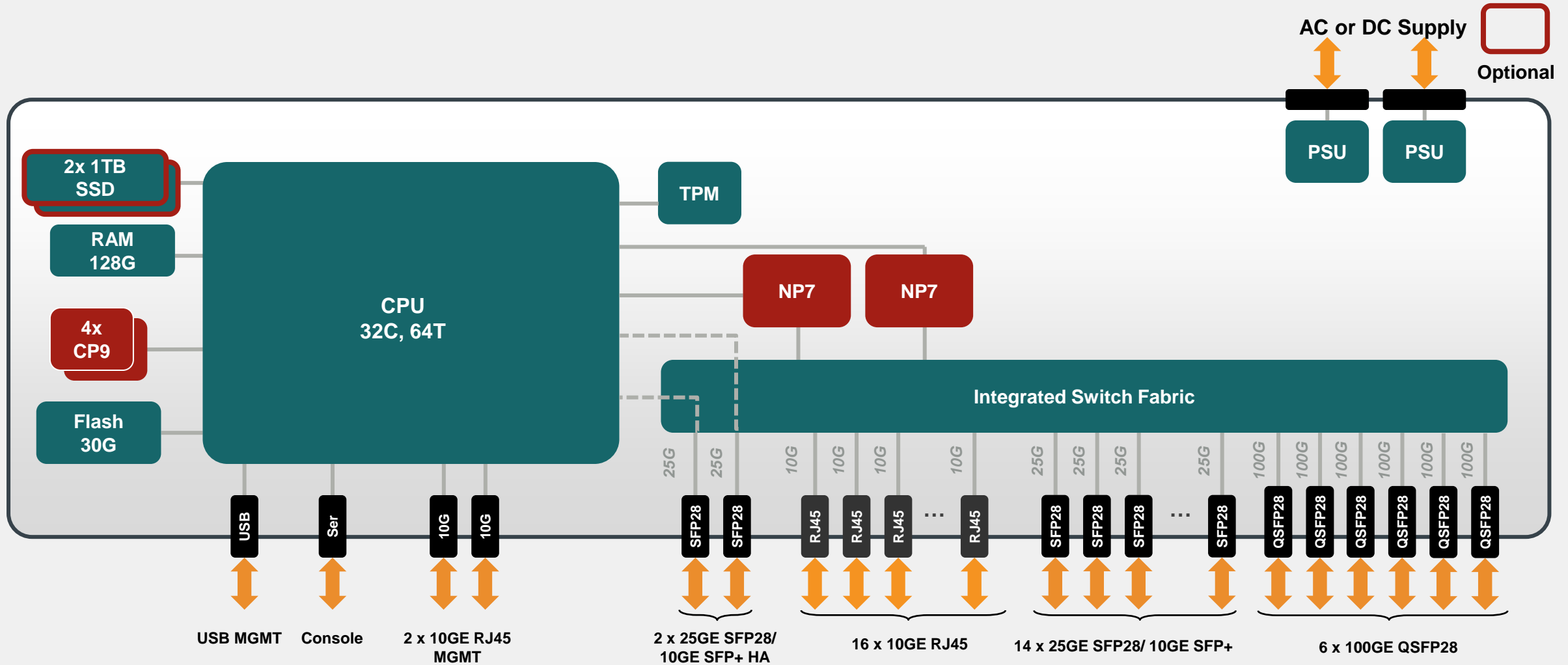


FortiGate 2600/2601F Port Mapping

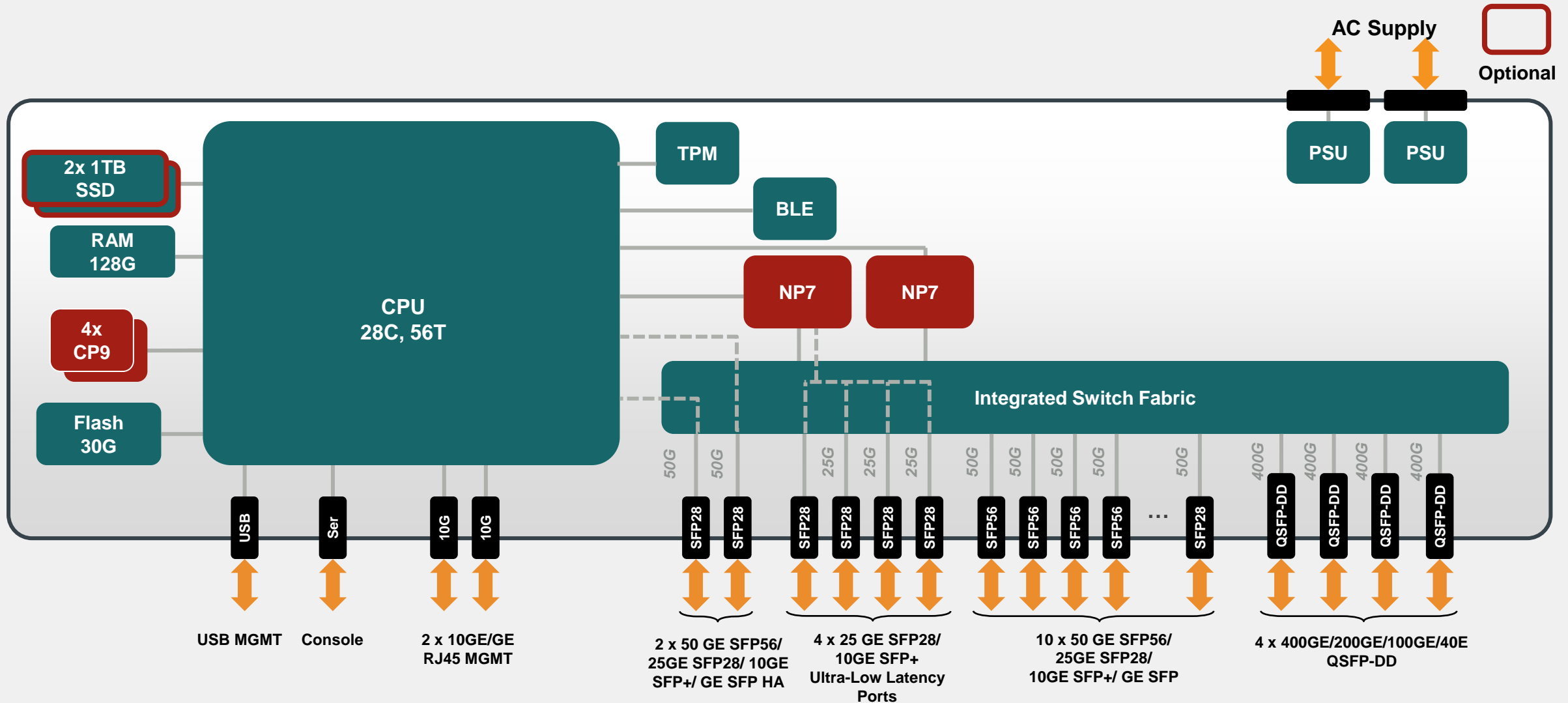


 Interface speed
port groups

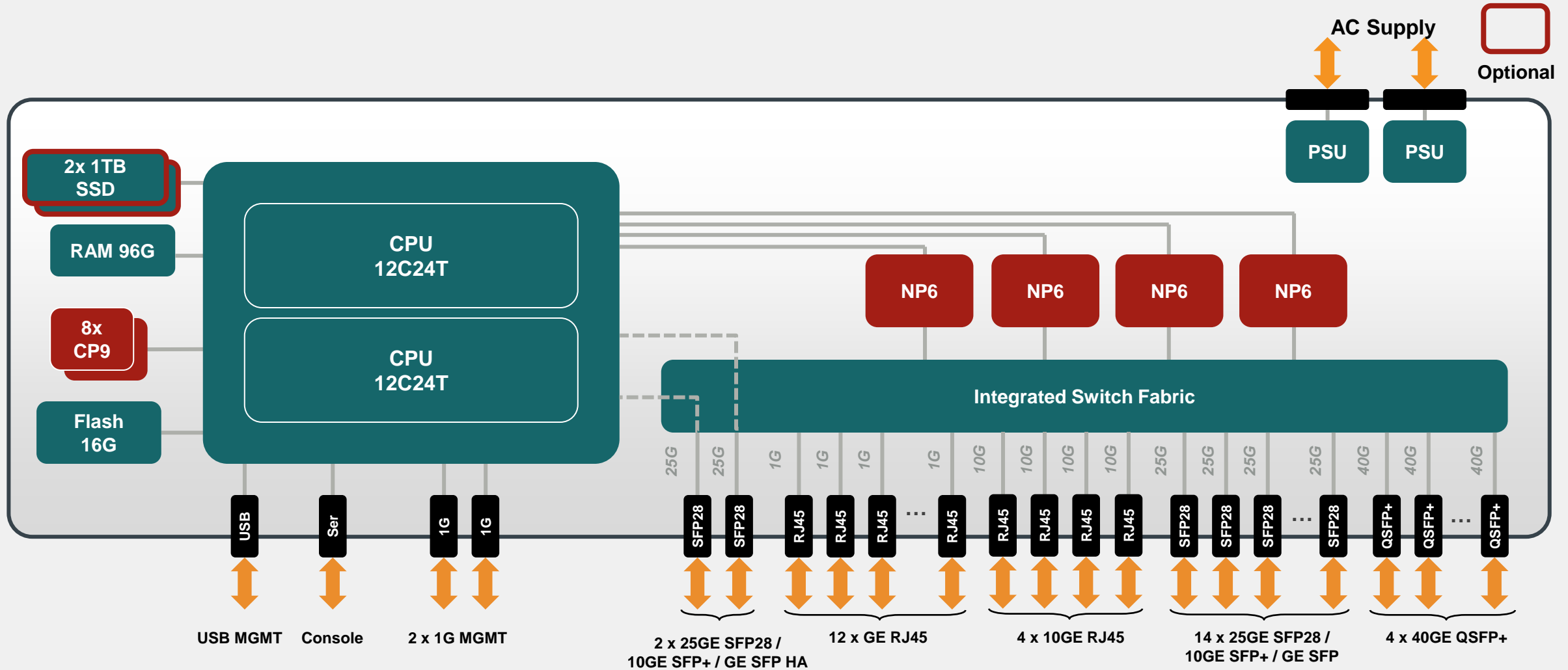
FortiGate 3000/3001F/-DC Schematic



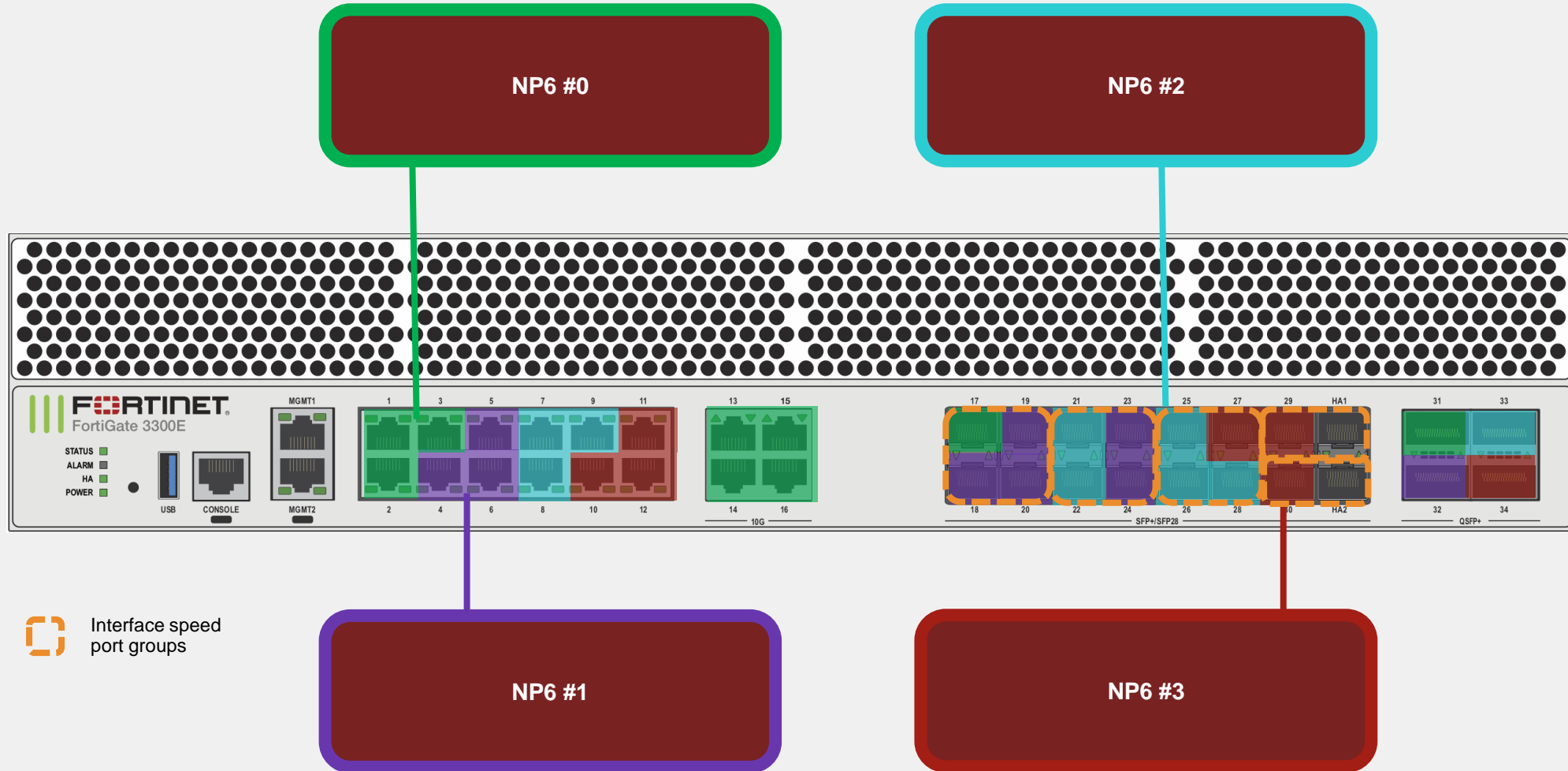
FortiGate 3200/3201F Schematic



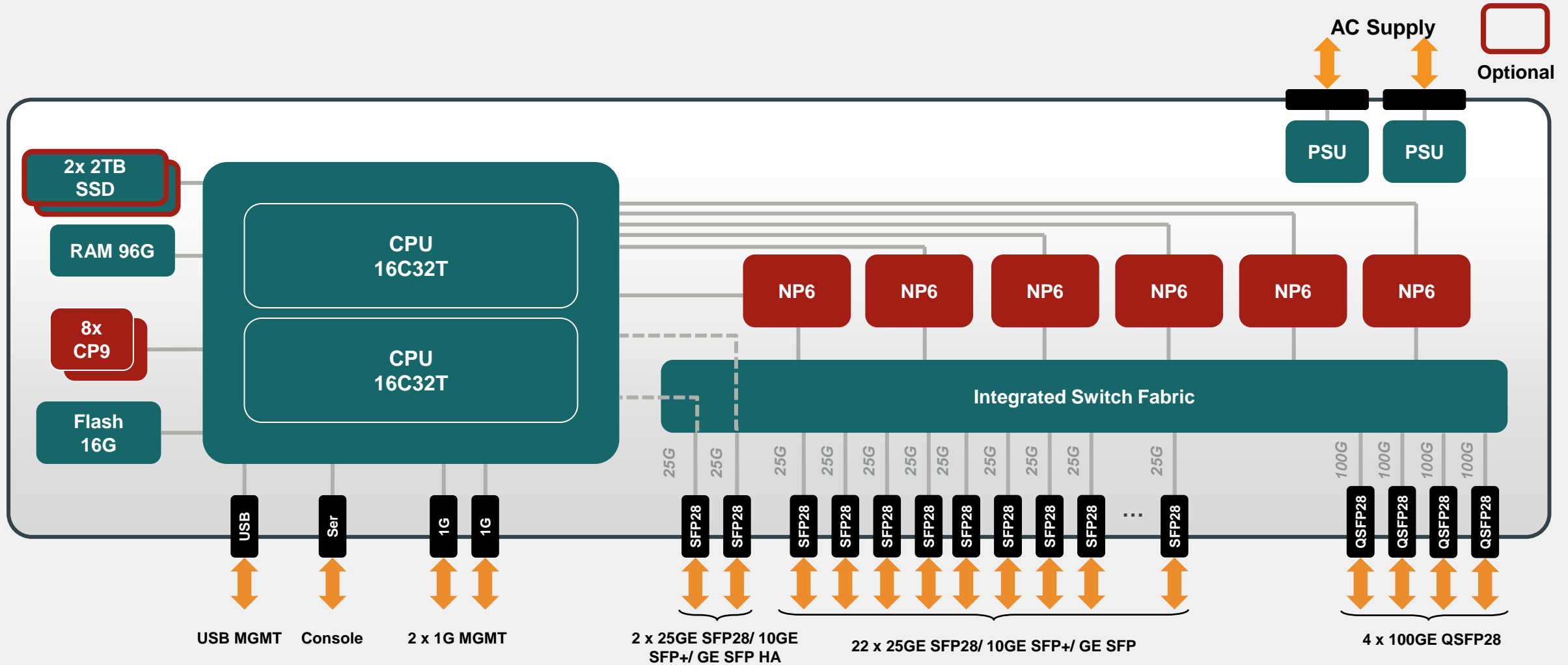
FortiGate 3300/3301E Schematic



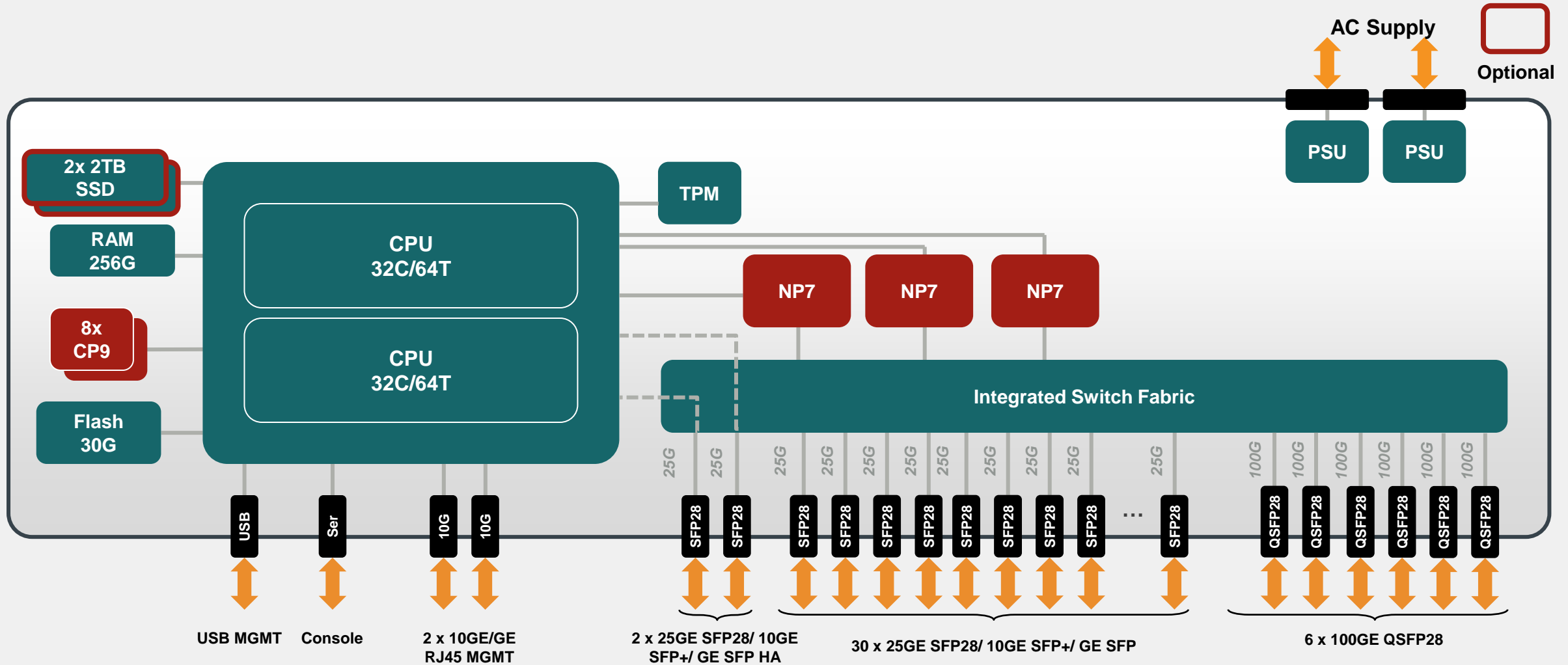
FortiGate 3300/3301E Port Mapping



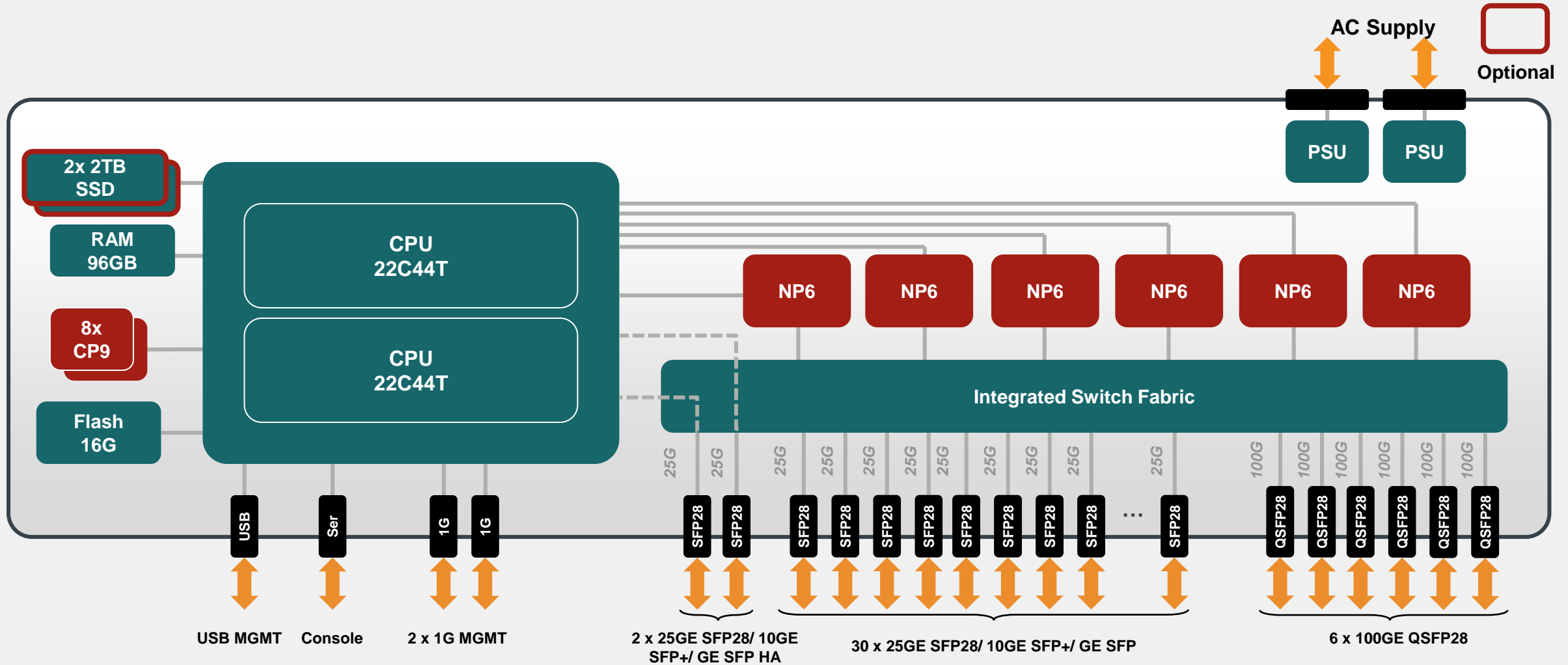
FortiGate 3400/3401E Schematic



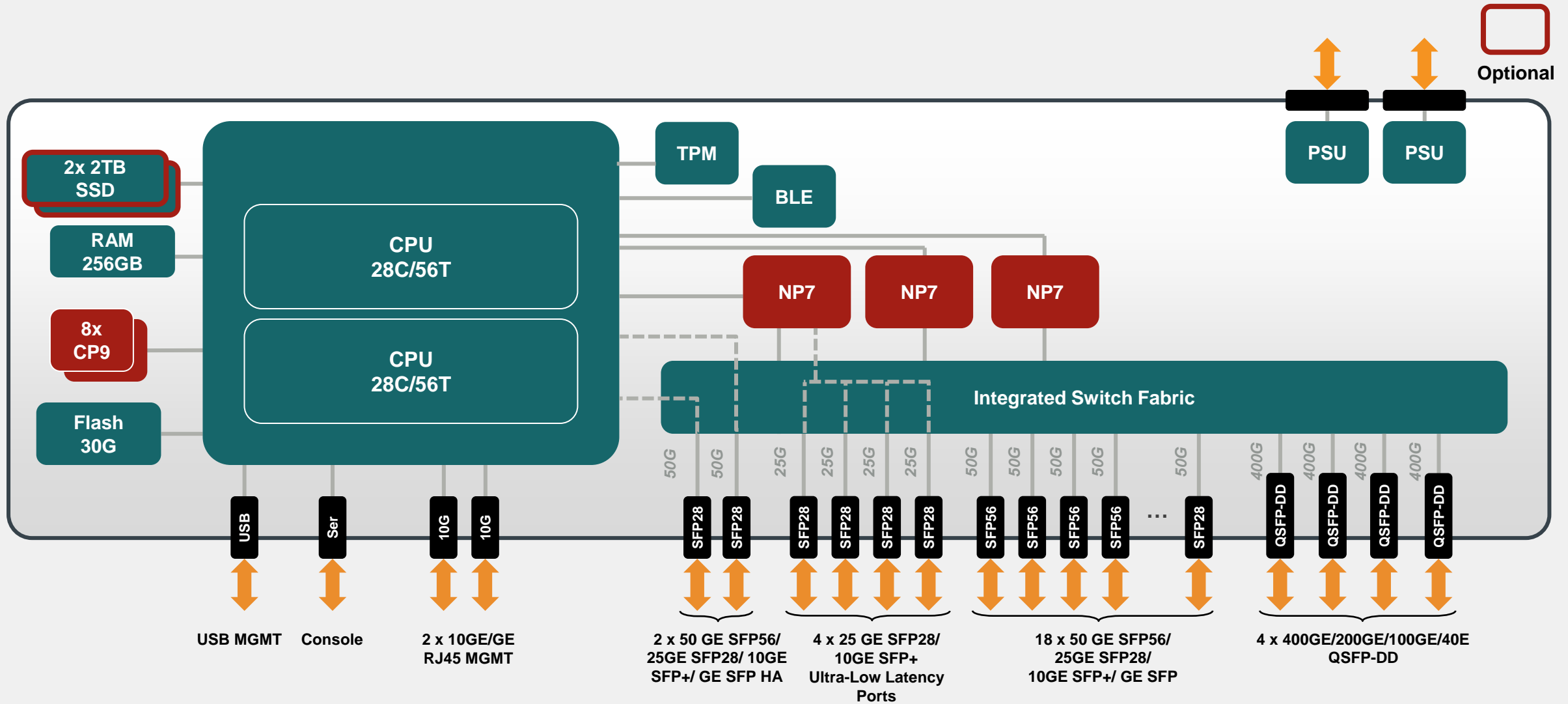
FortiGate 3500/3501F Schematic



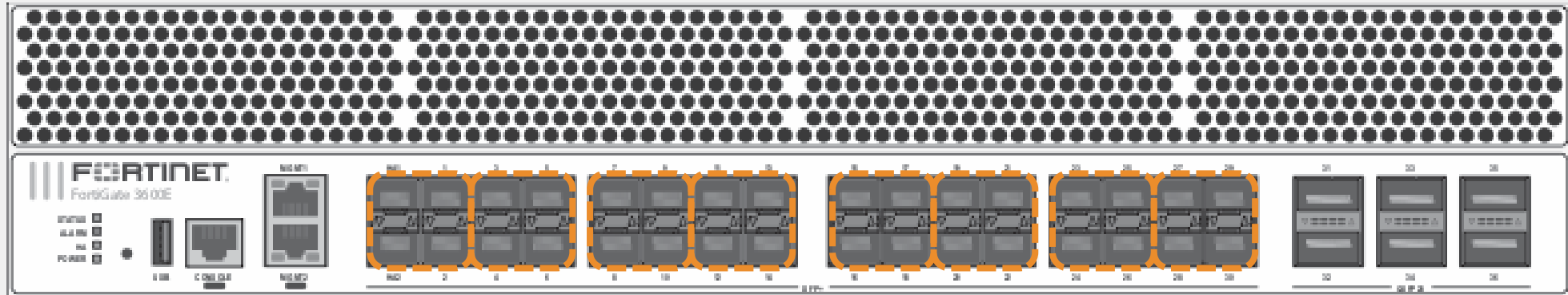
FortiGate 3600/3601E Schematic



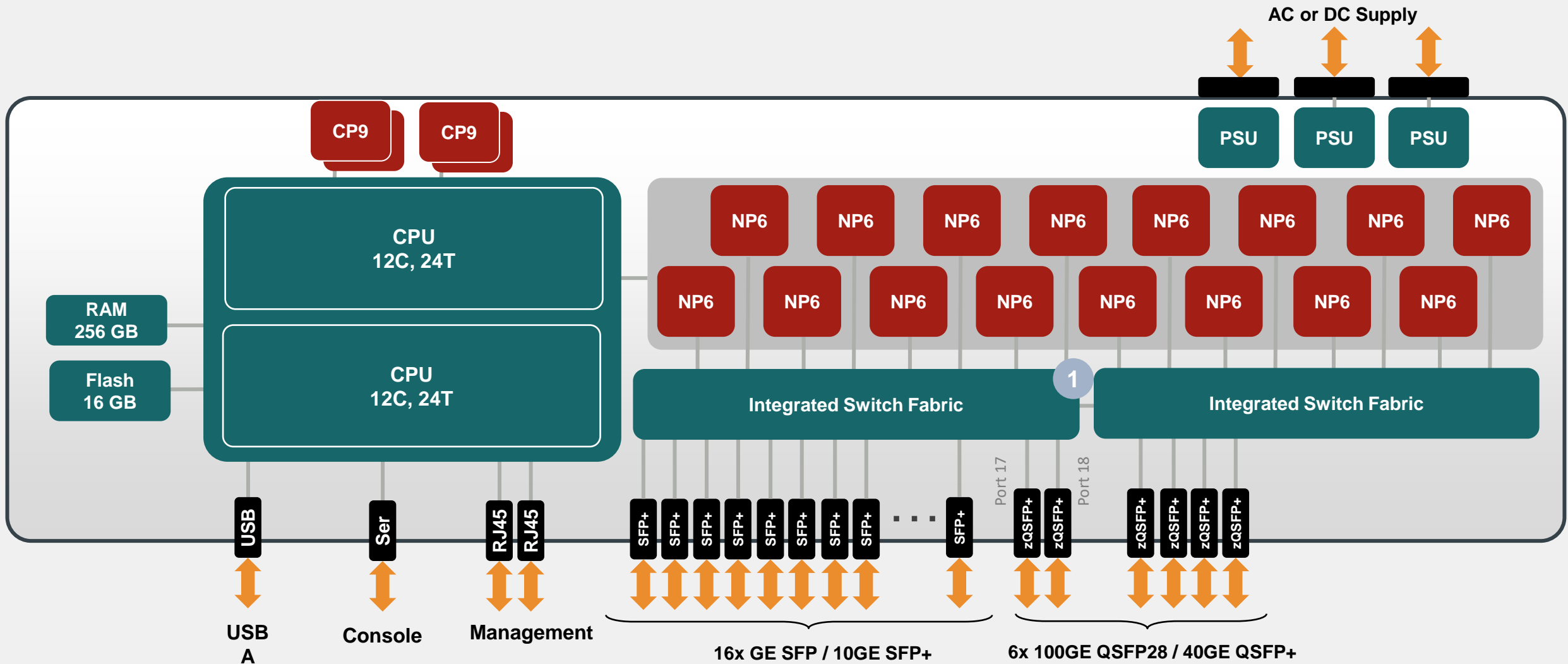
FortiGate 3700/3701F Schematic



FortiGate 3600/3601E Port Mapping

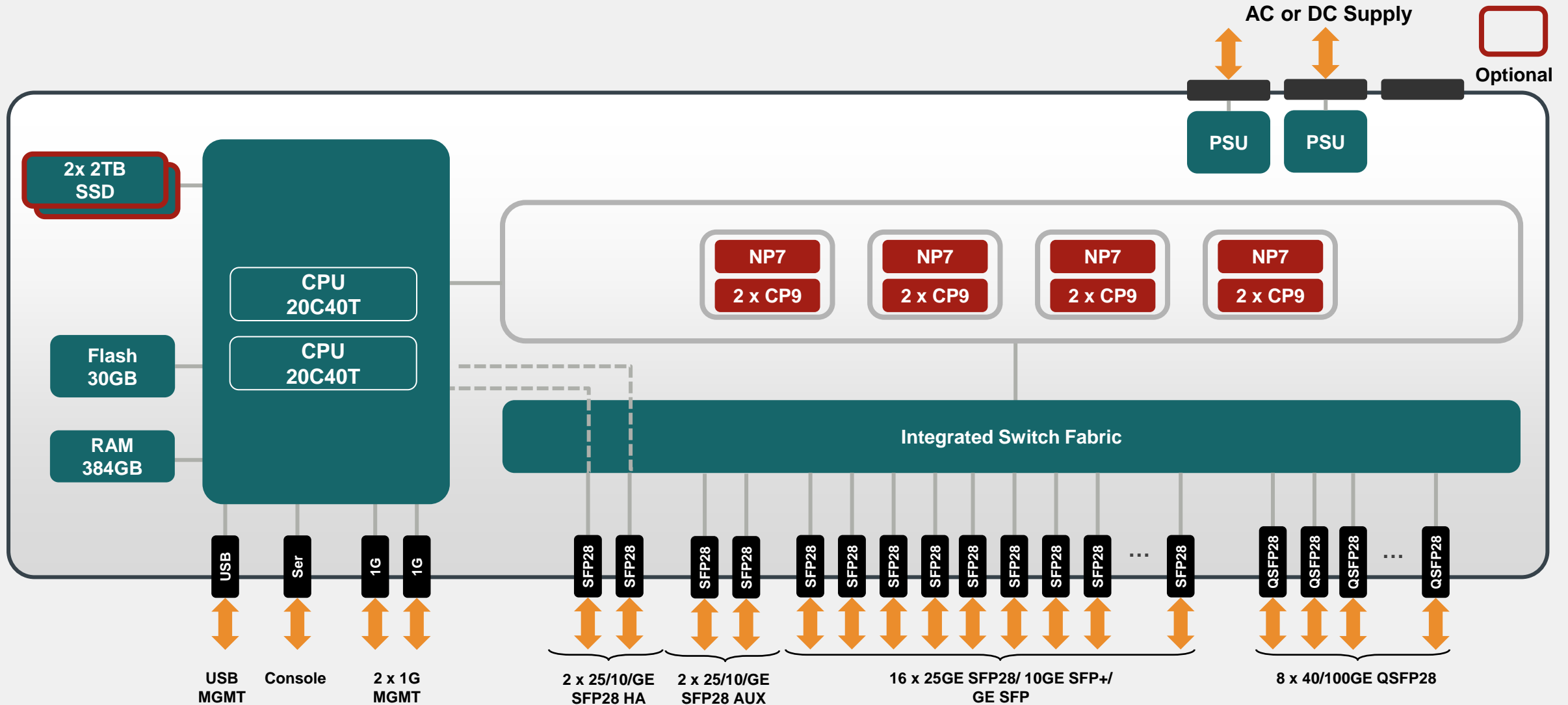


FortiGate 3960E/-DC Schematic

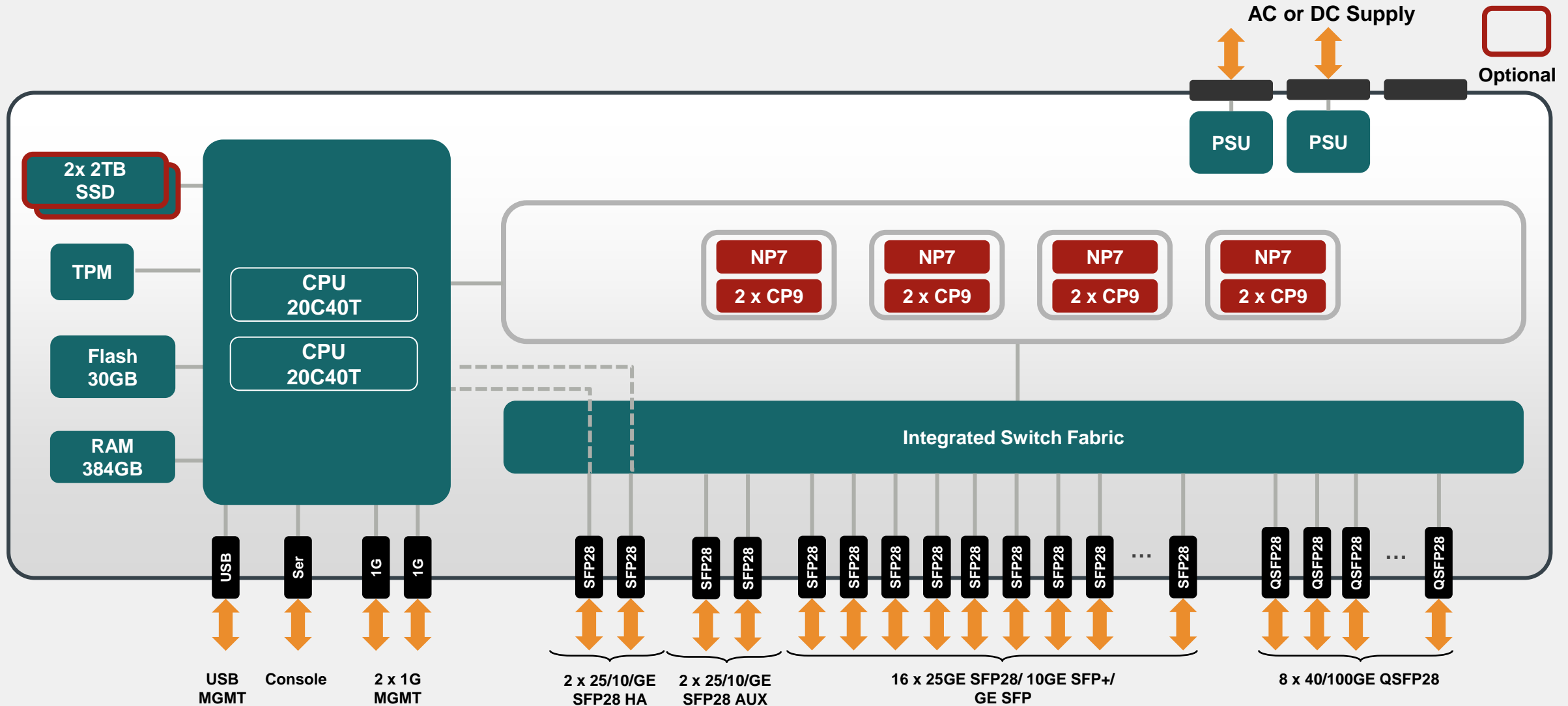




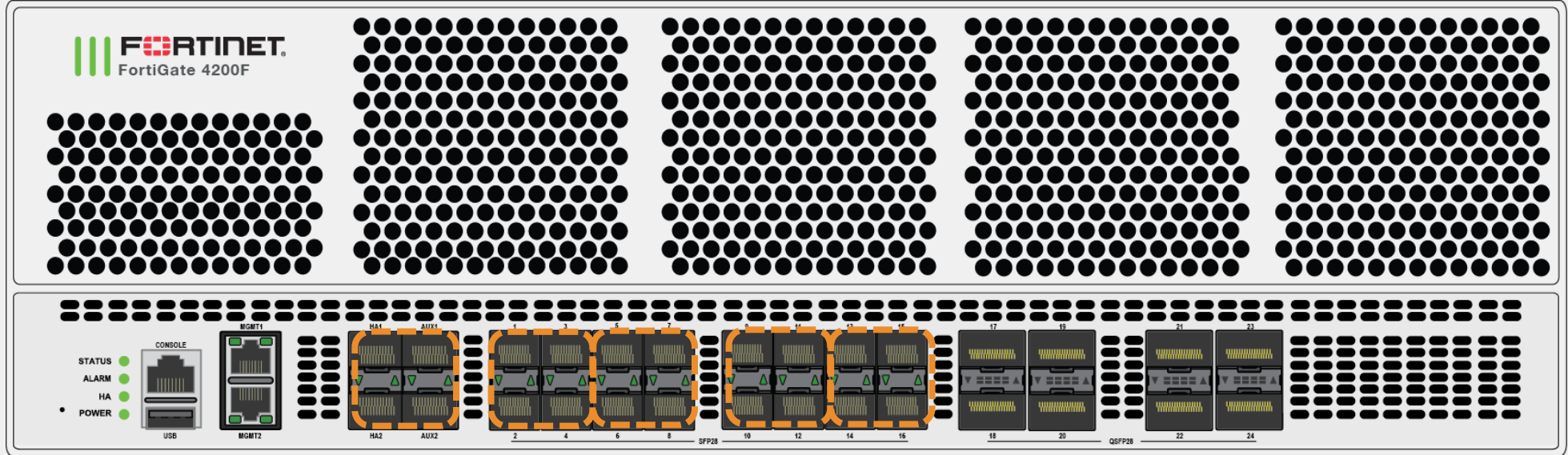
FortiGate 4200/4201F/-DC Schematic




FortiGate 4200/4201F/-DC Gen2 Schematic

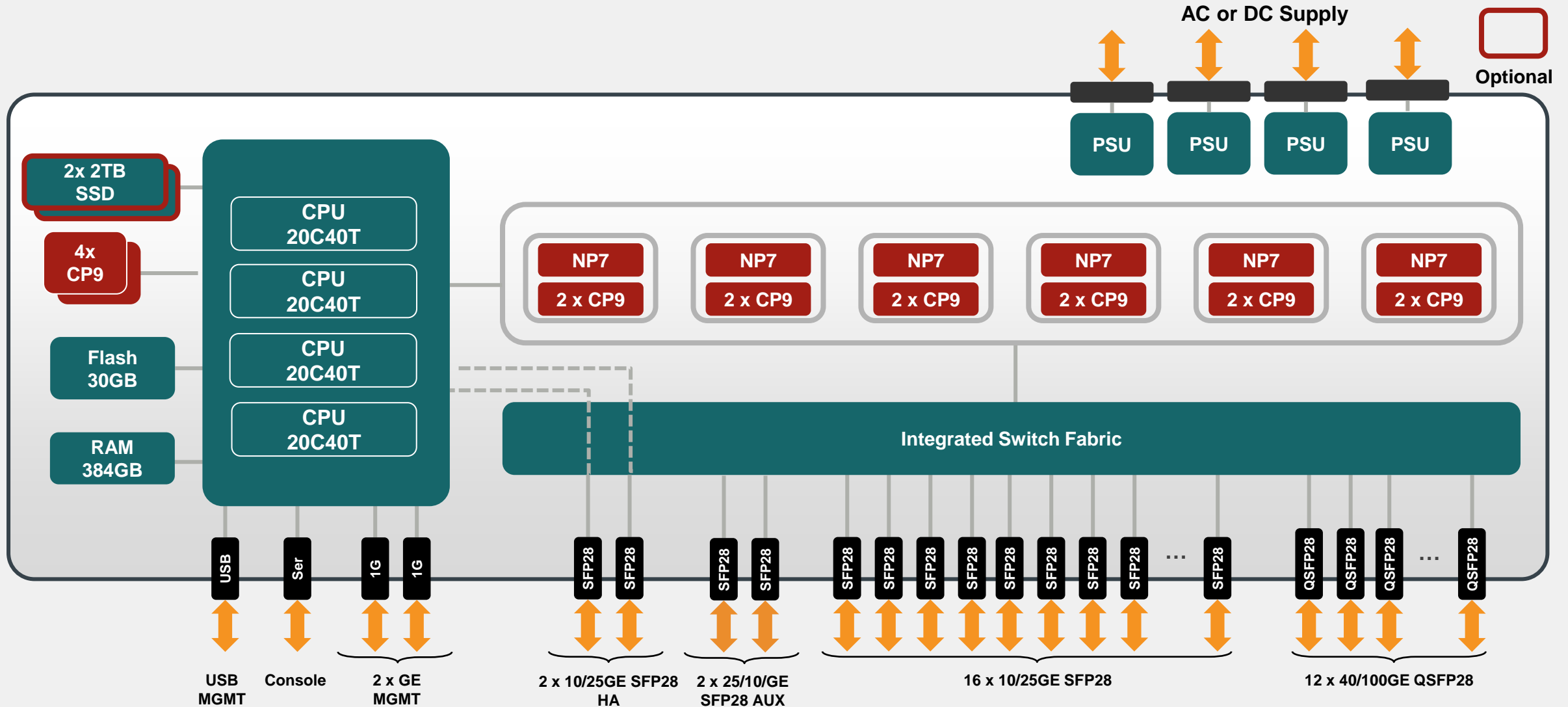


FortiGate 4200/4201F Port Mapping

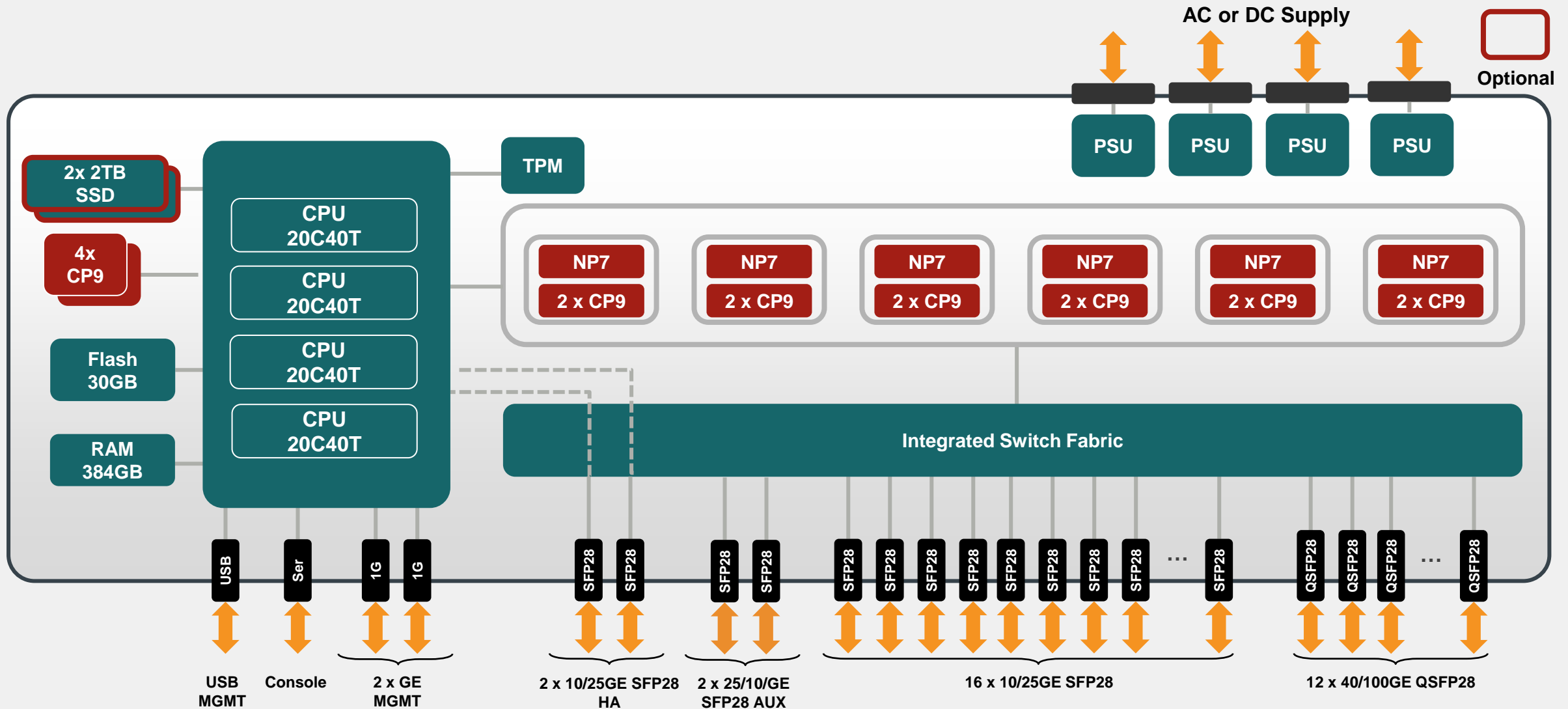


 Interface speed port groups

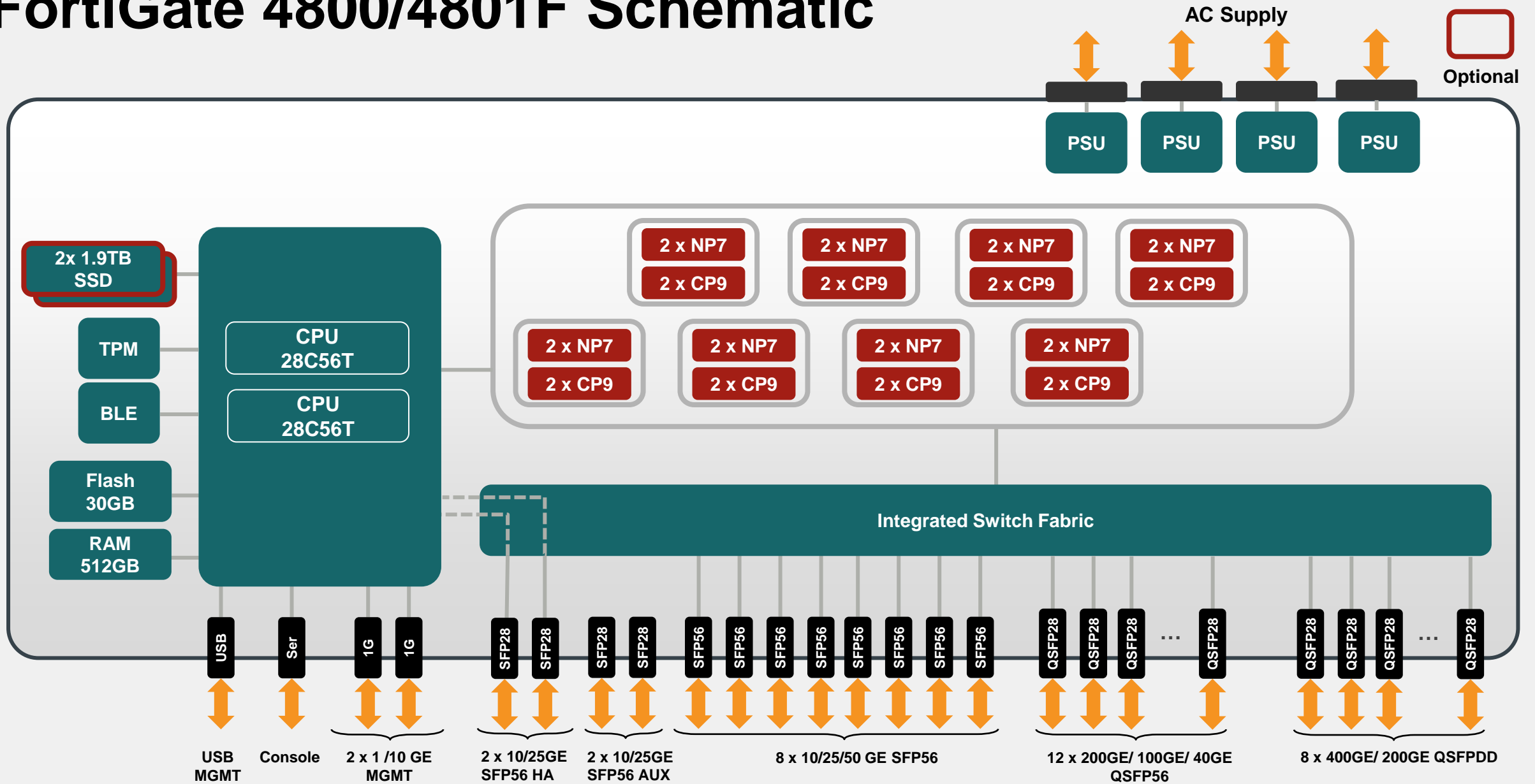
FortiGate 4400/4401F/-DC Schematic



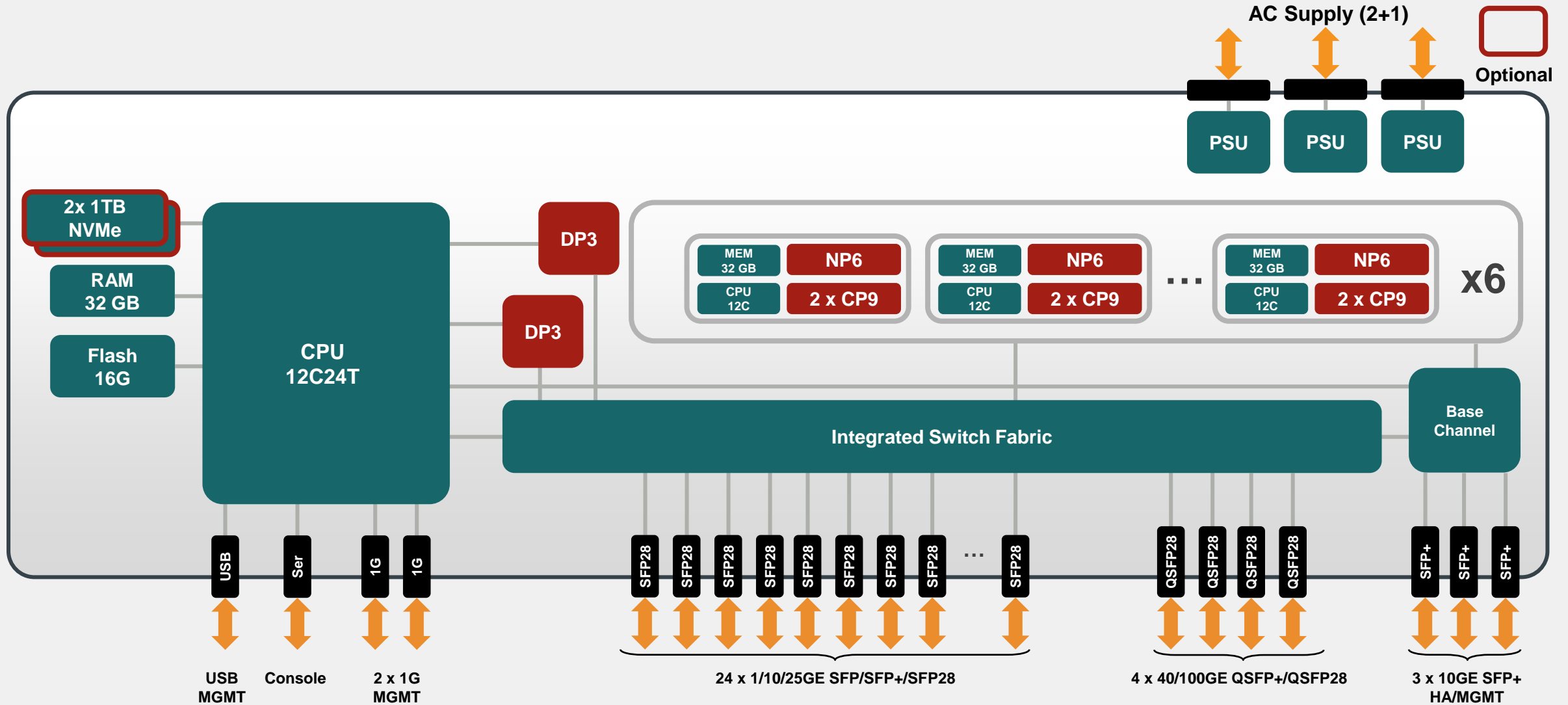
FortiGate 4400/4401F/-DC Gen2 Schematic



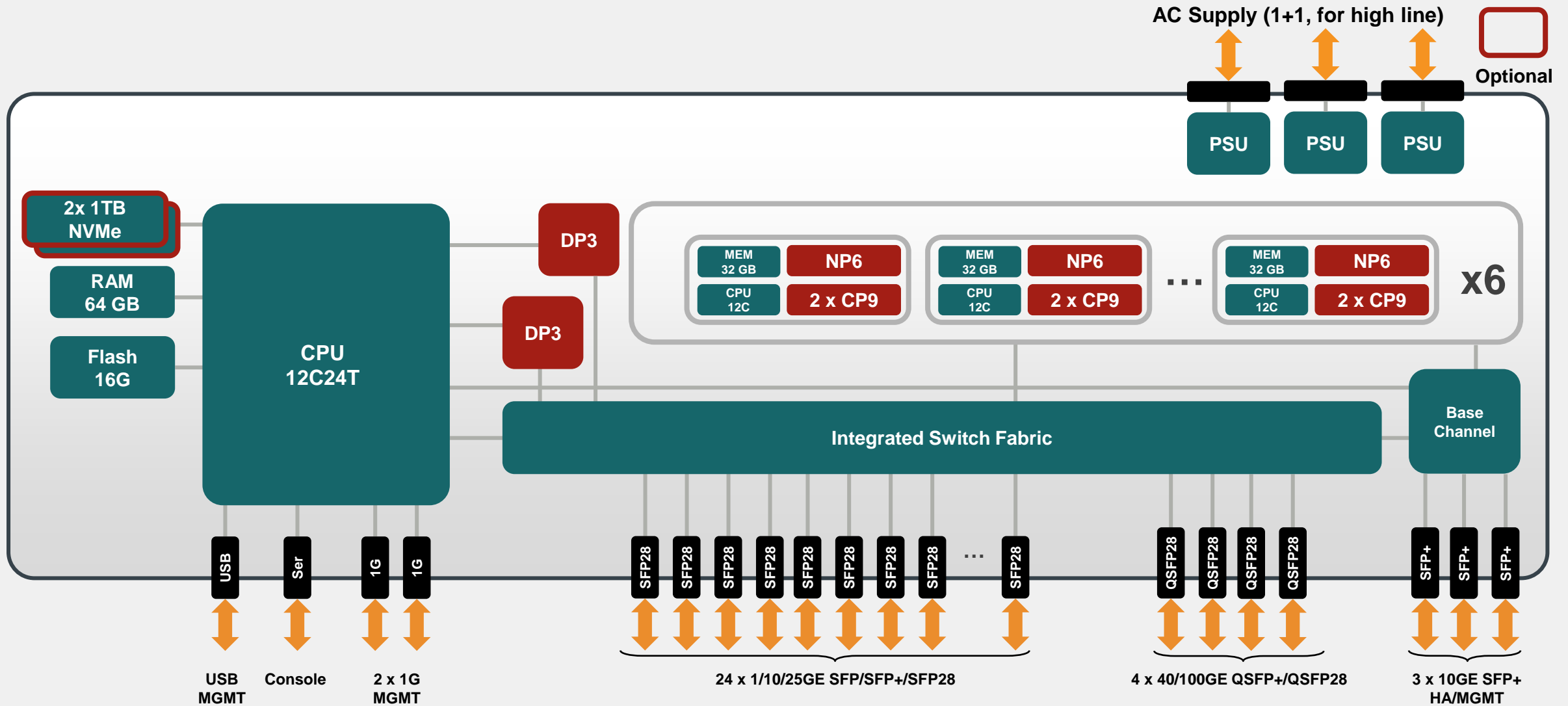
FortiGate 4800/4801F Schematic



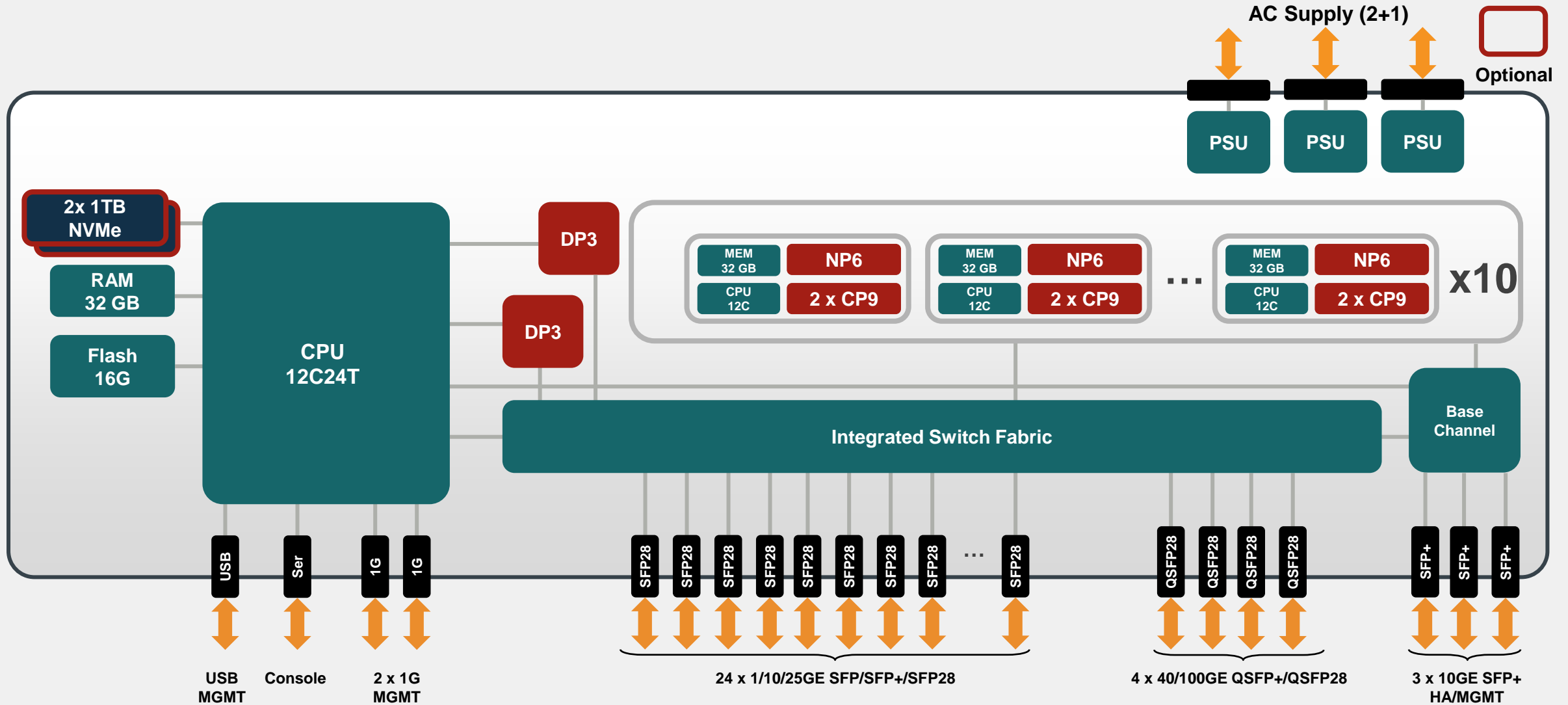
FortiGate 6300/6301F Schematic



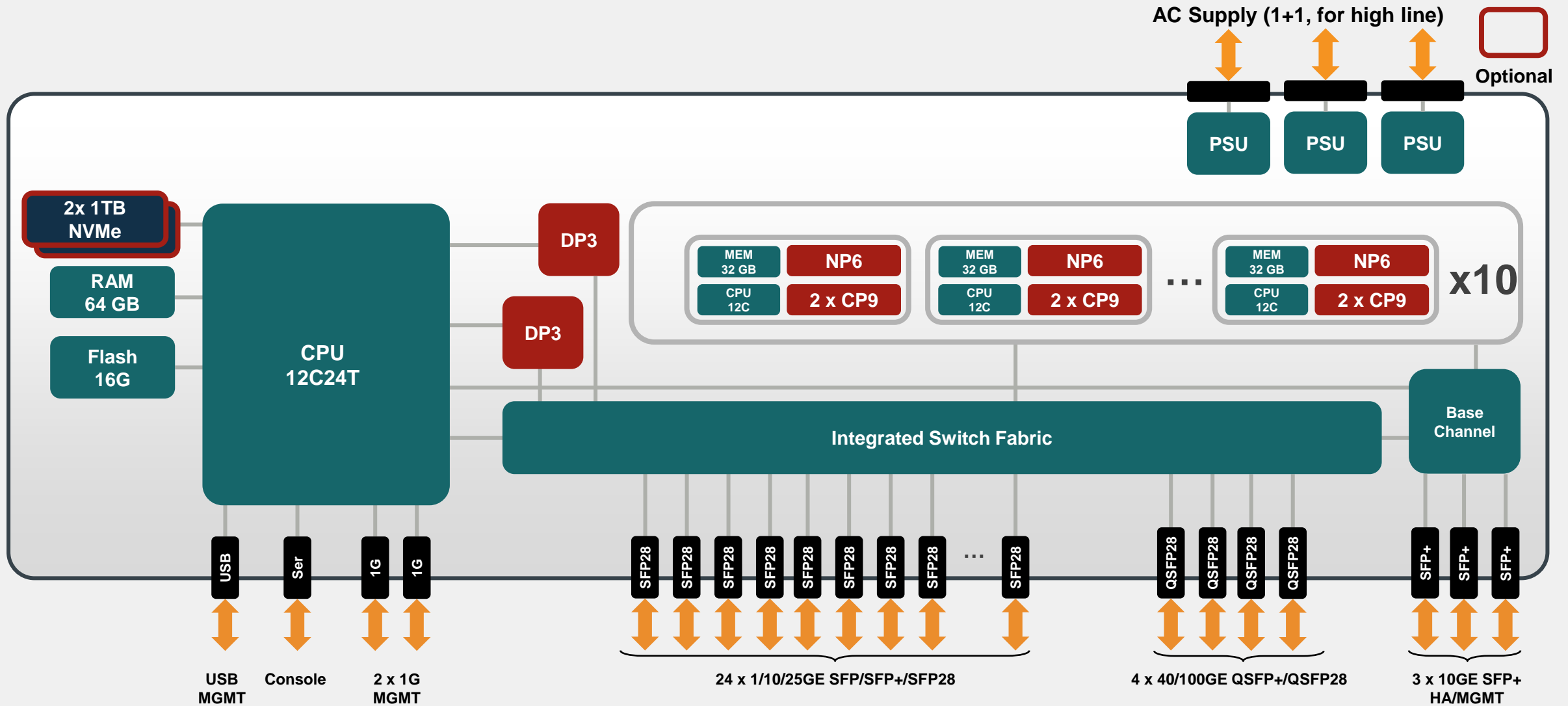
FortiGate 6300/6301F-Gen2 Schematic



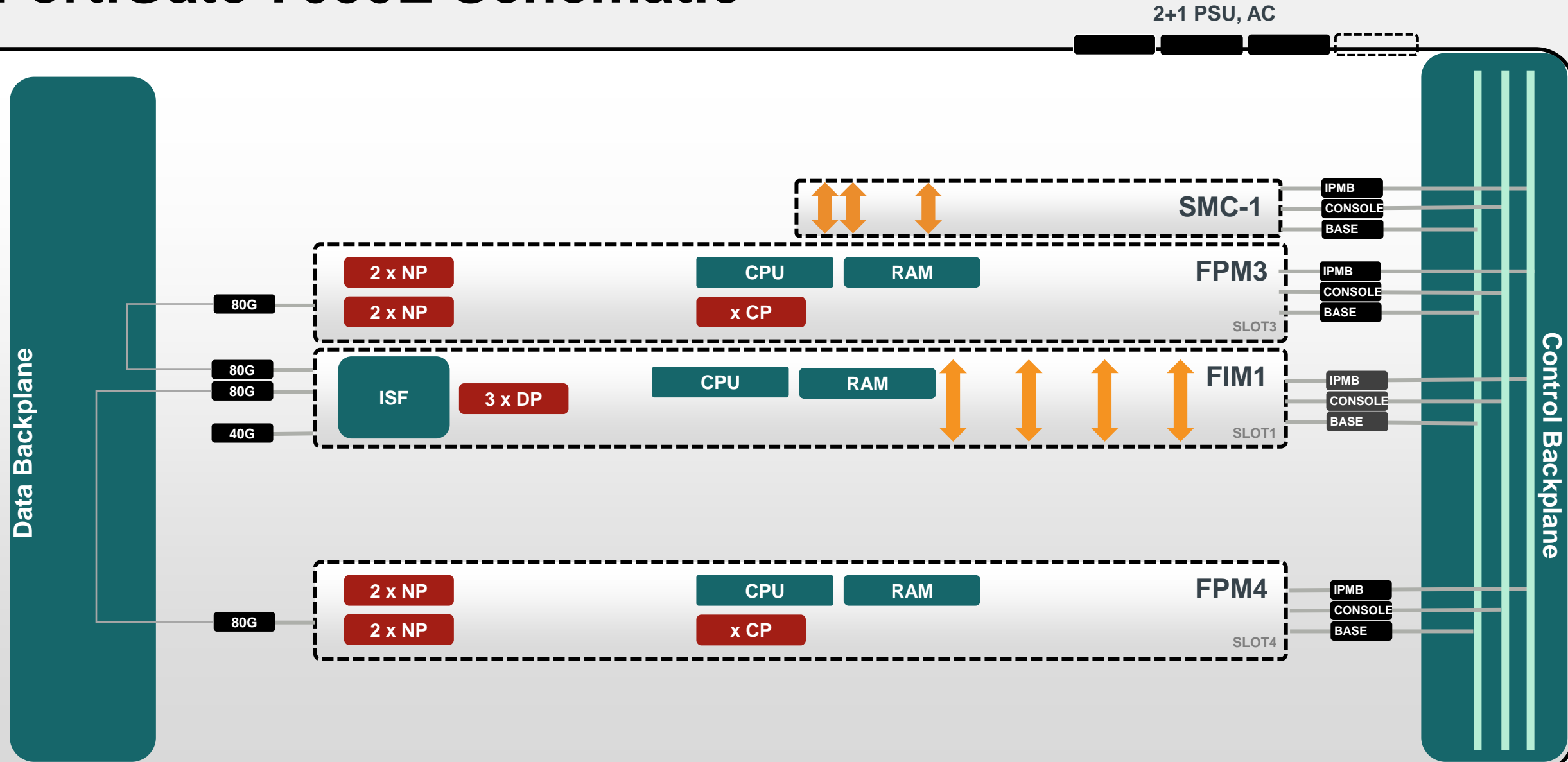
FortiGate 6500/6501F Schematic



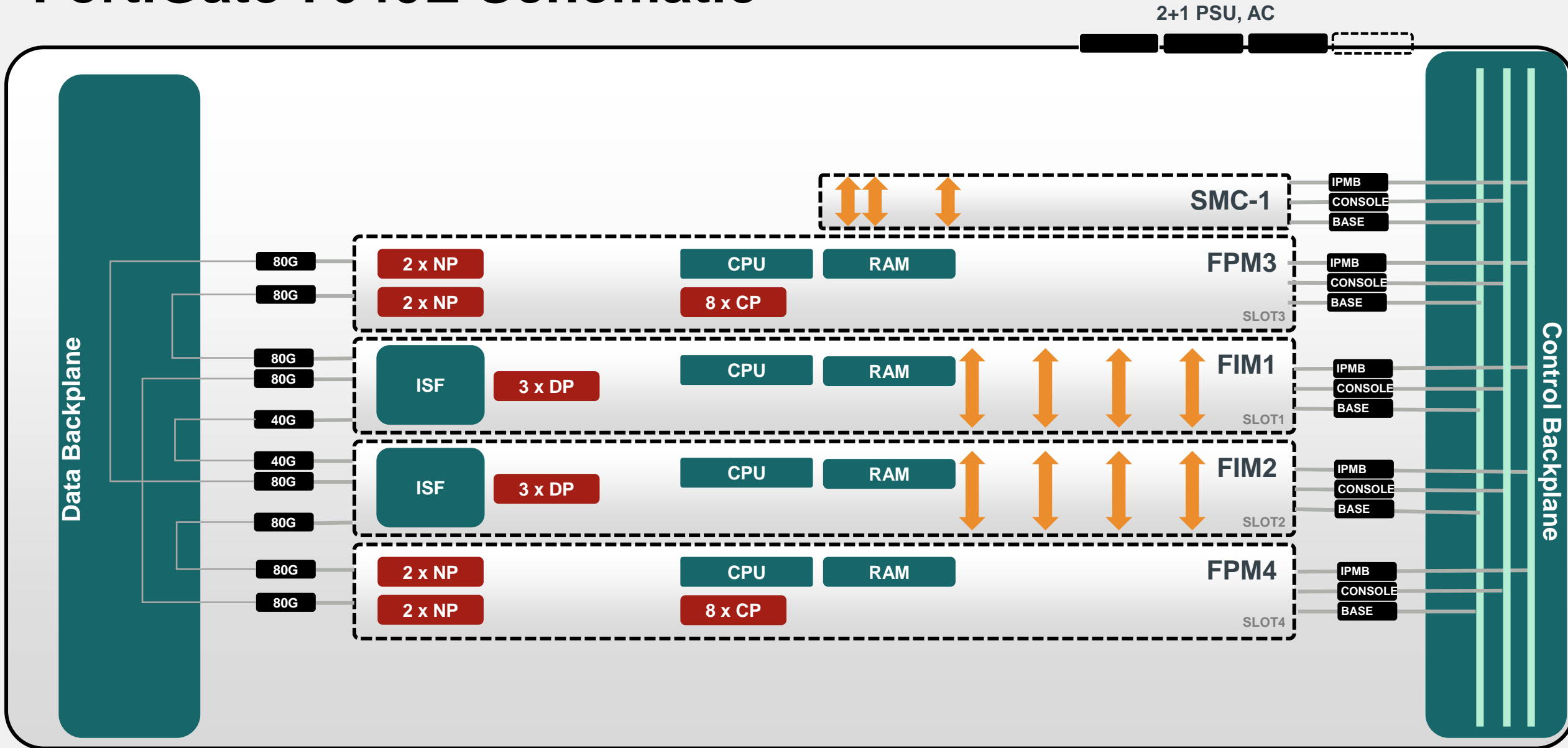
FortiGate 6500/6501F-Gen2 Schematic



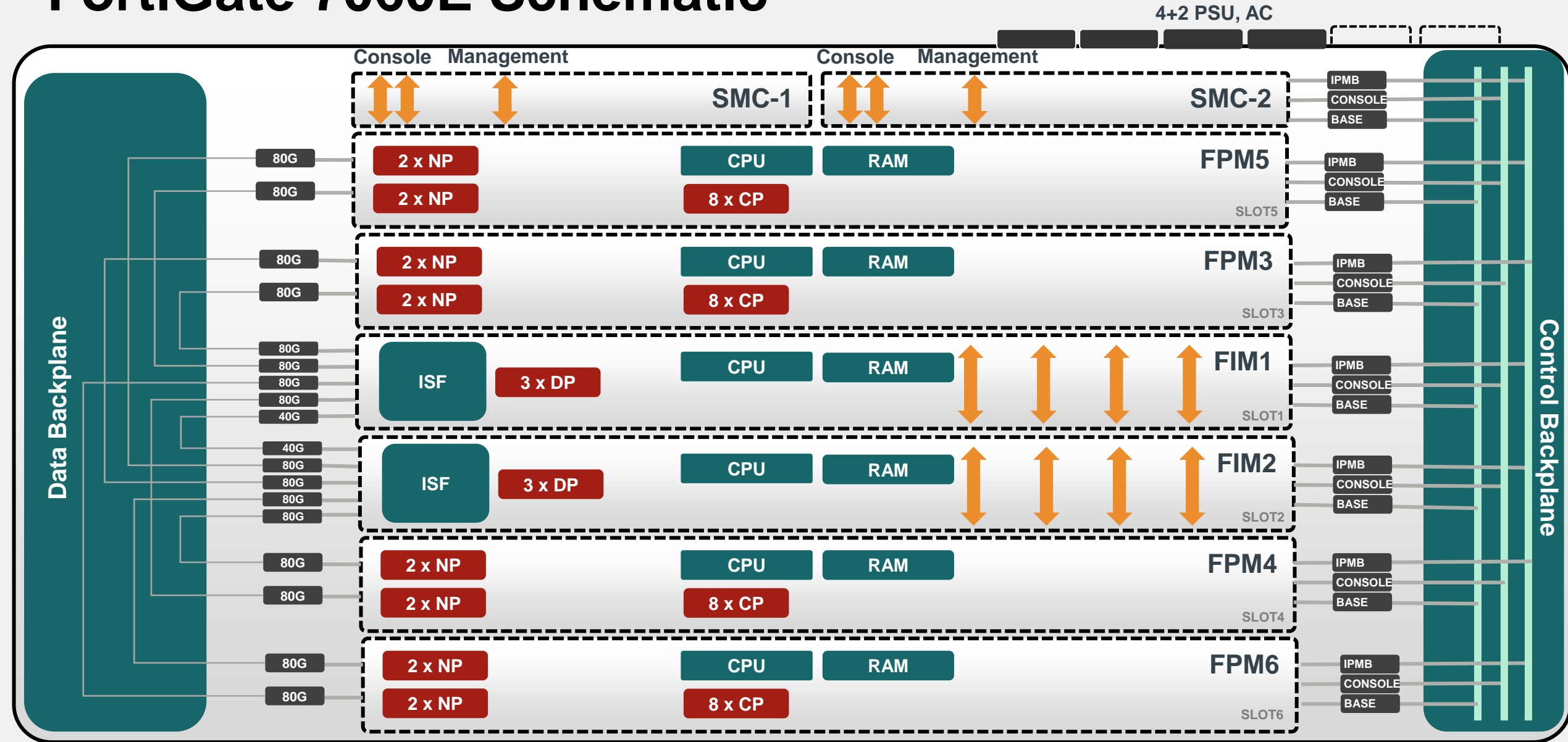
FortiGate 7030E Schematic



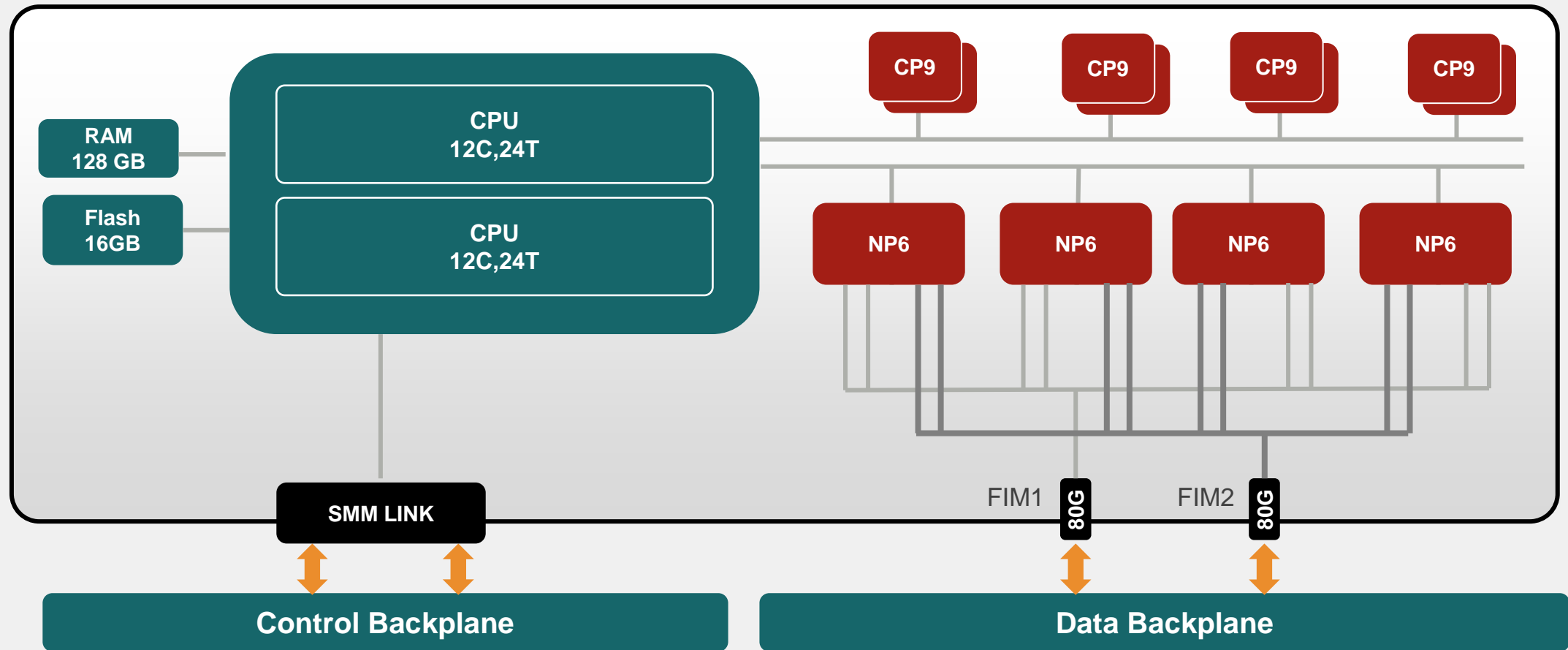
FortiGate 7040E Schematic



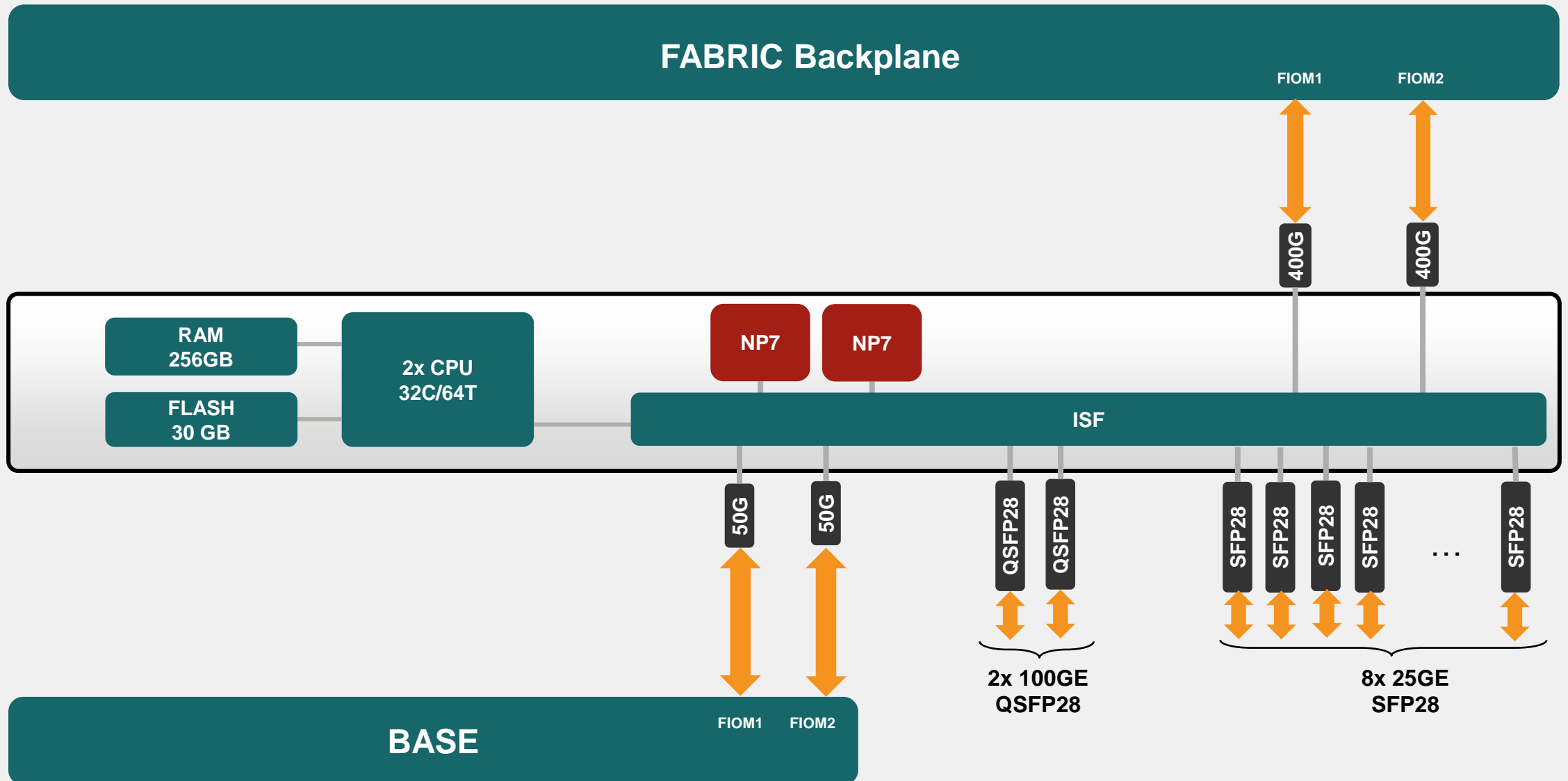
FortiGate 7060E Schematic



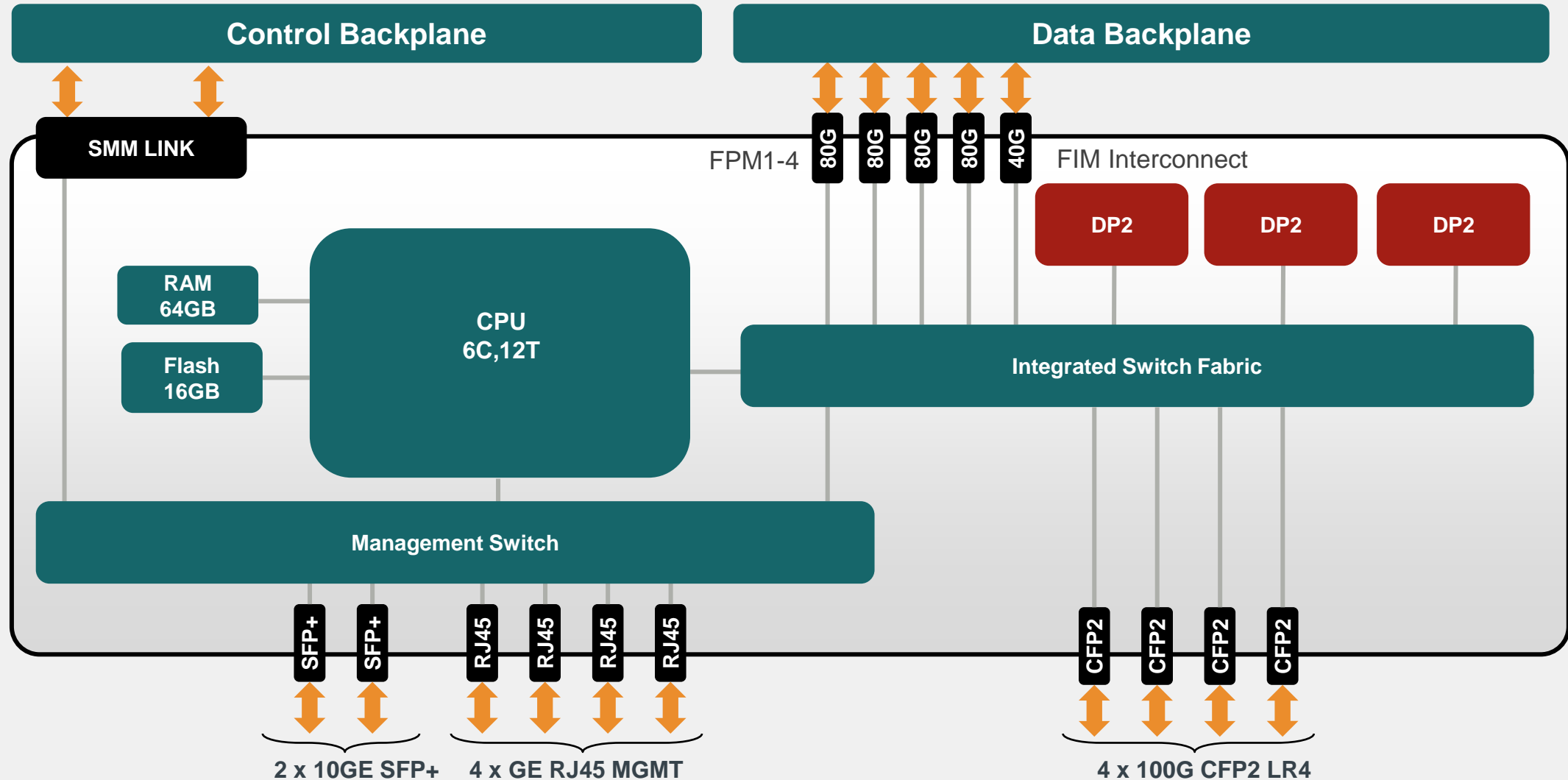
FPM-7620E Gen2 Schematic



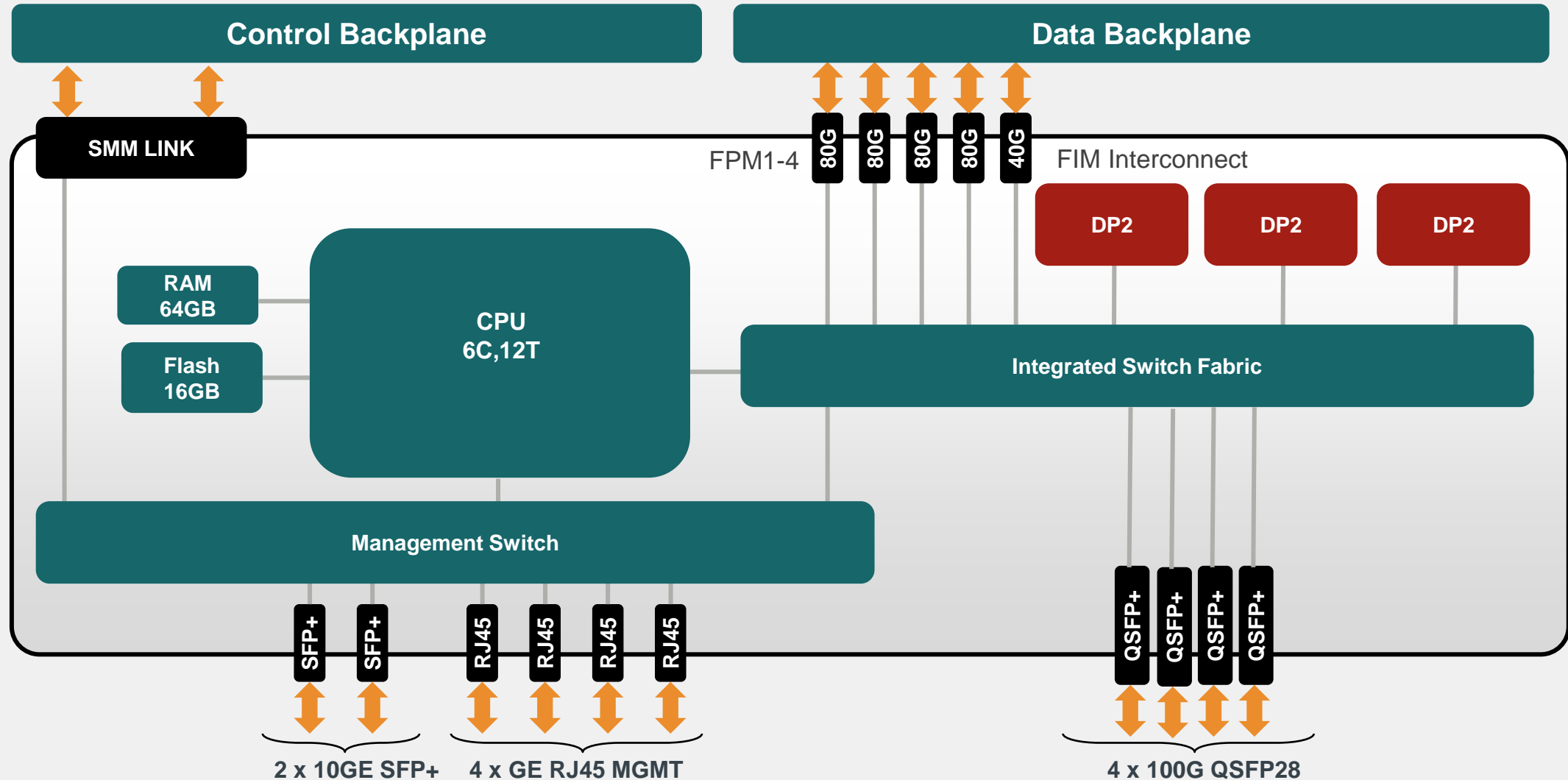
FPM-7620F Schematic



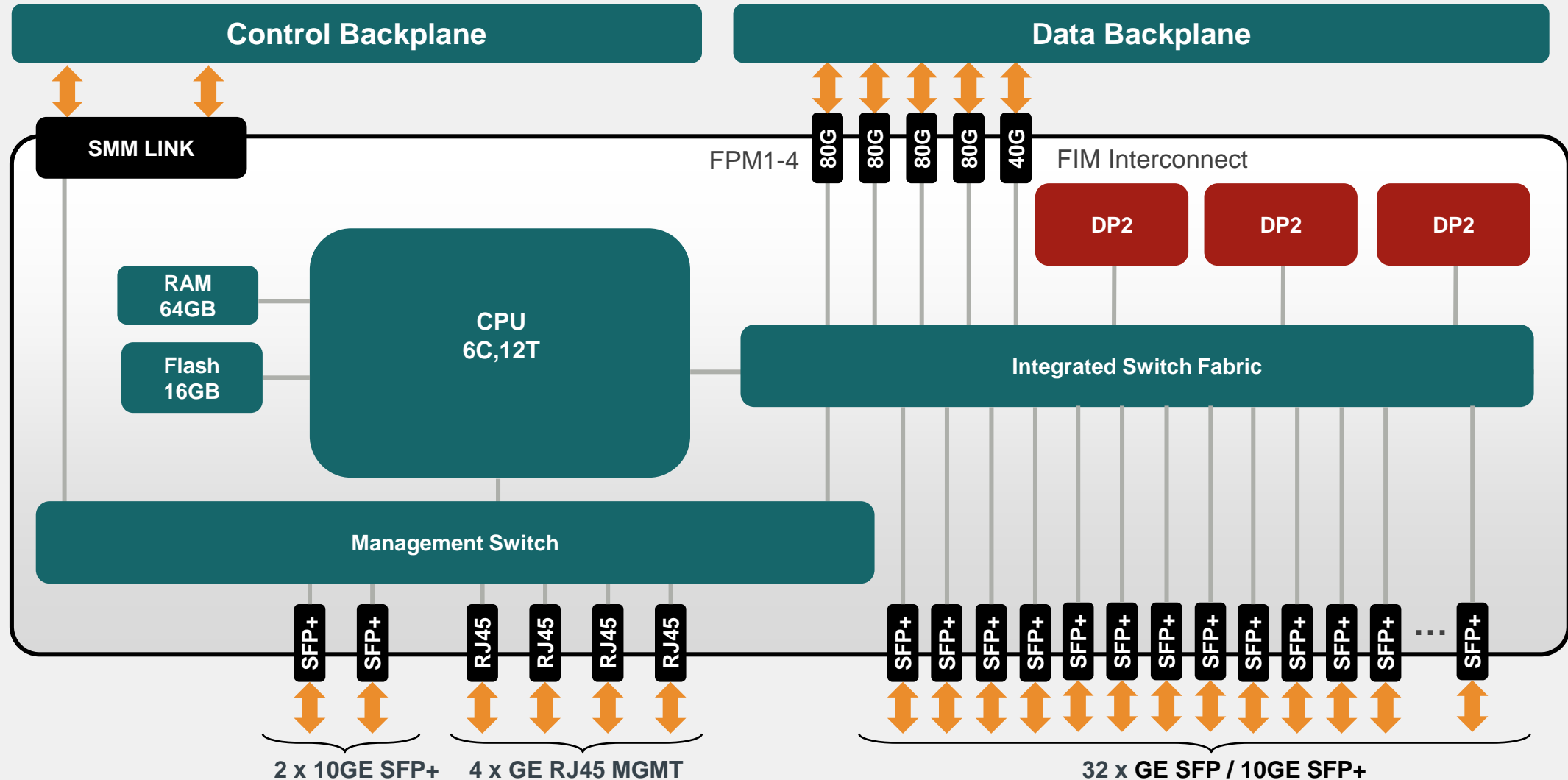
FIM-7910E Schematic



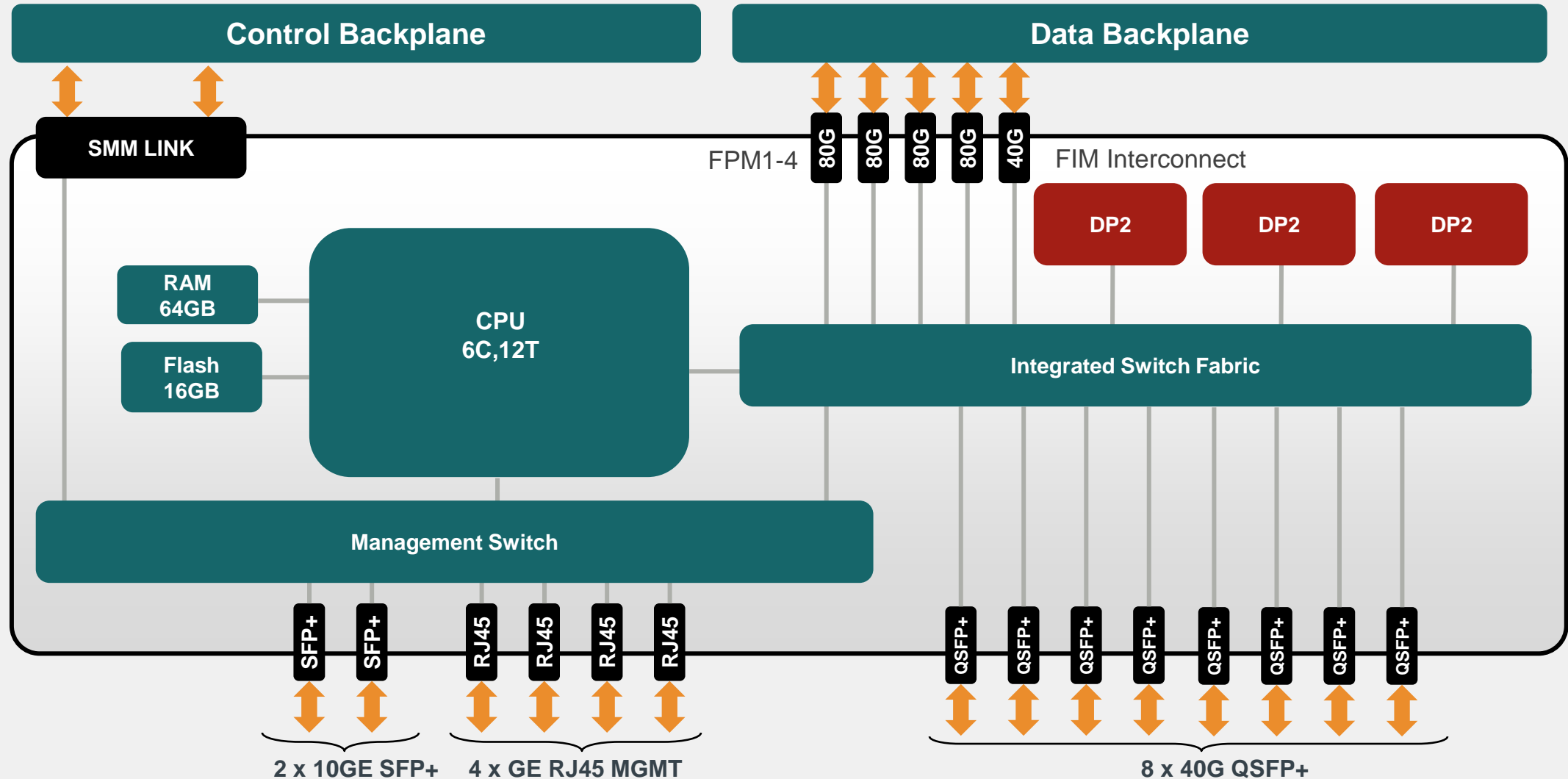
FIM-7920E Schematic



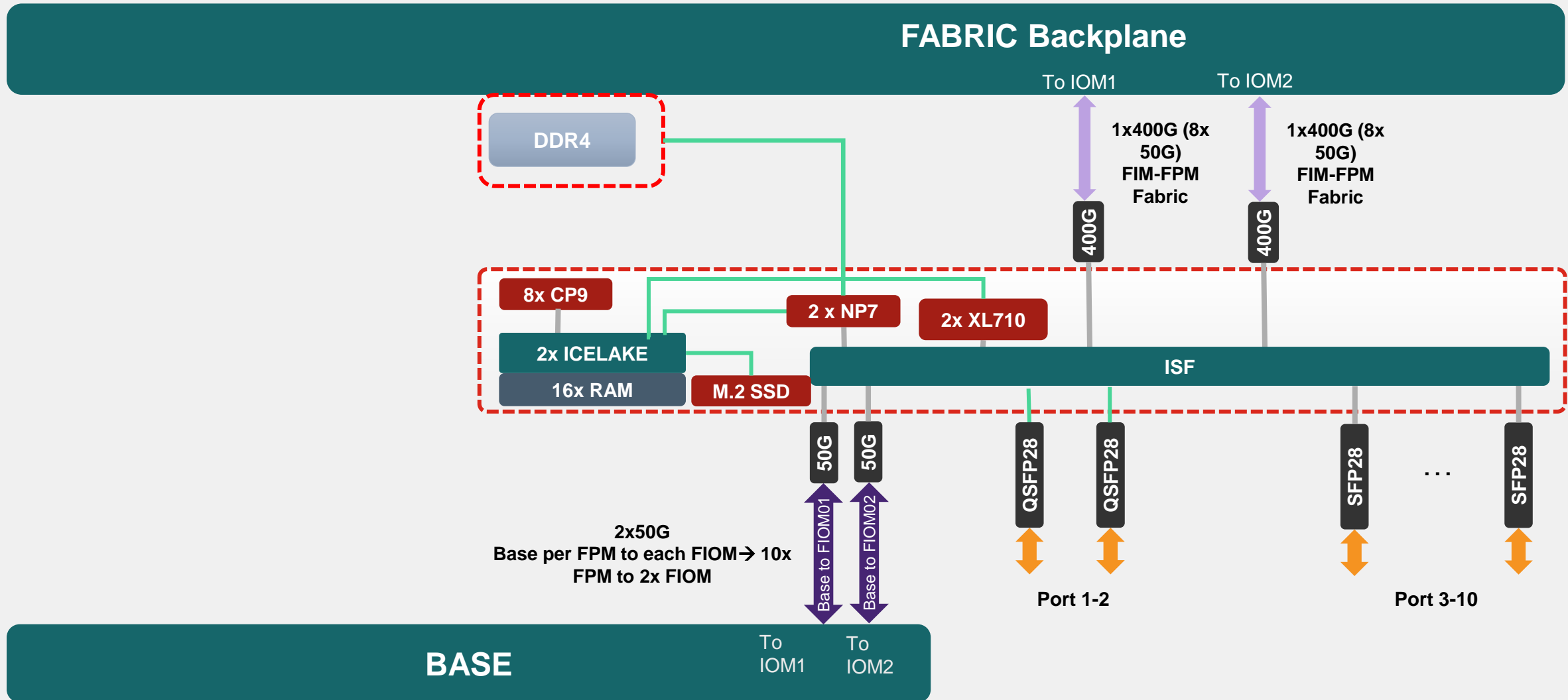
FIM-7901E Schematic



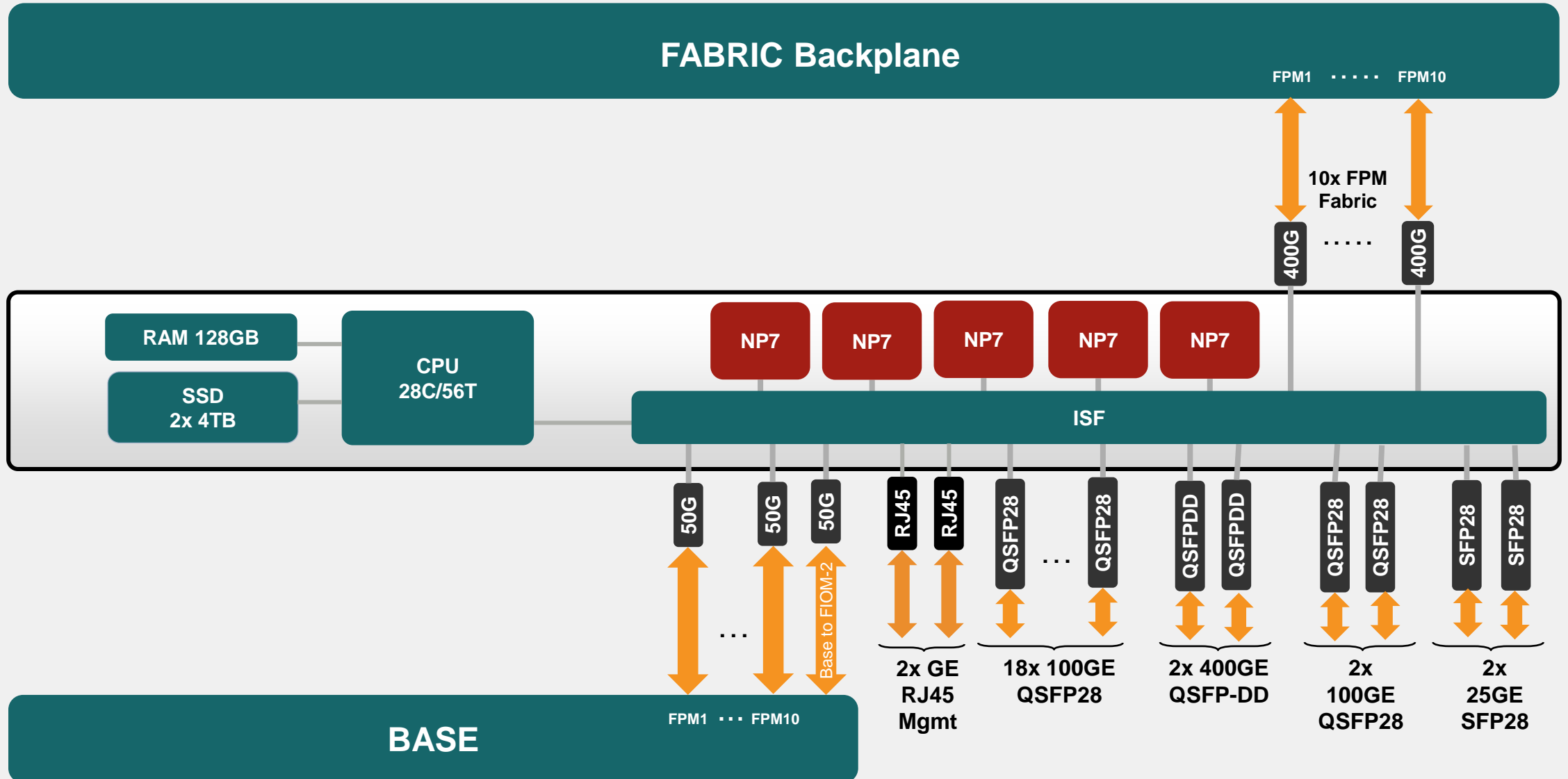
FIM-7904E Schematic



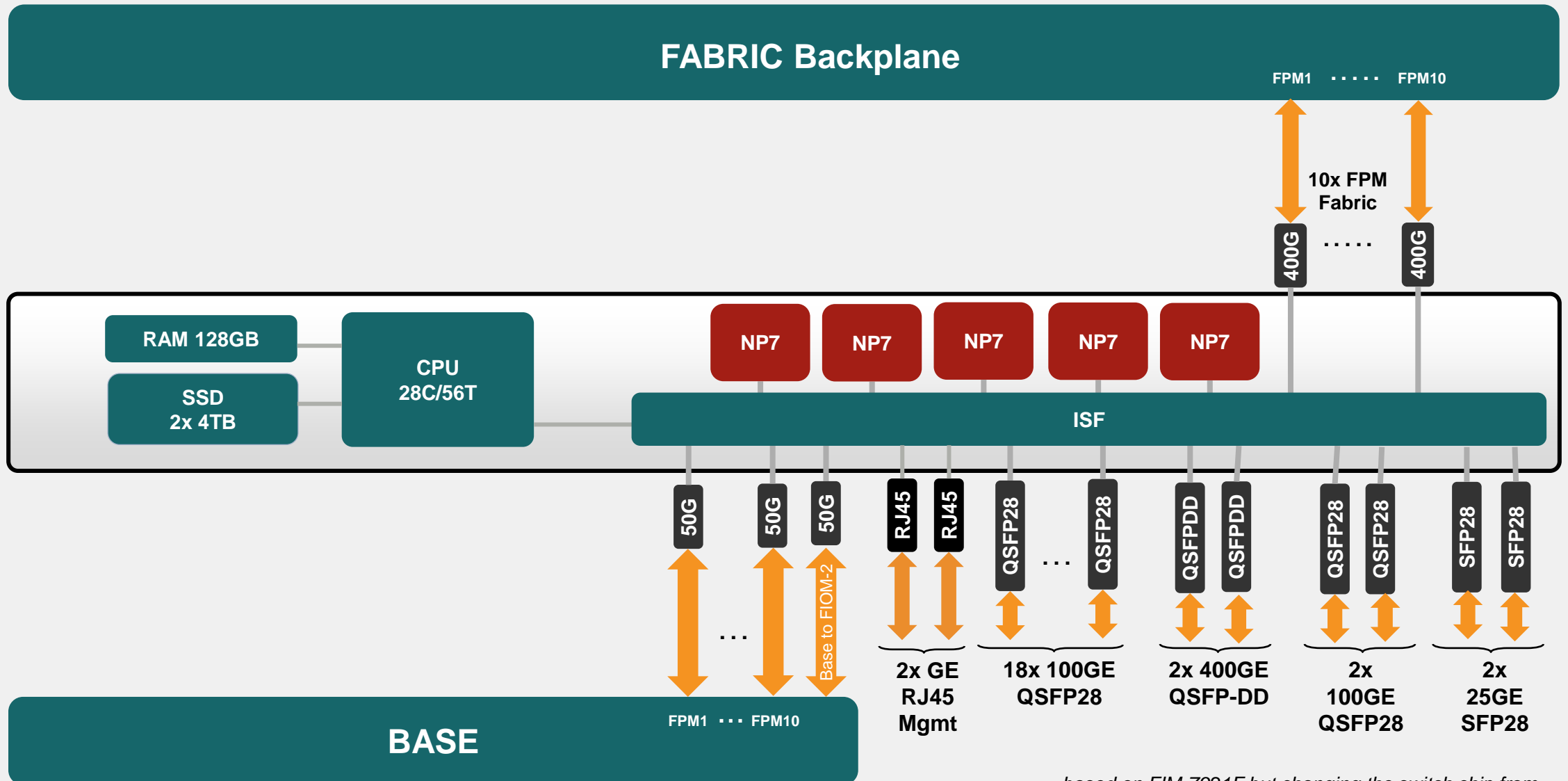
FIM-7920F Schematic



FIM-7921F Schematic



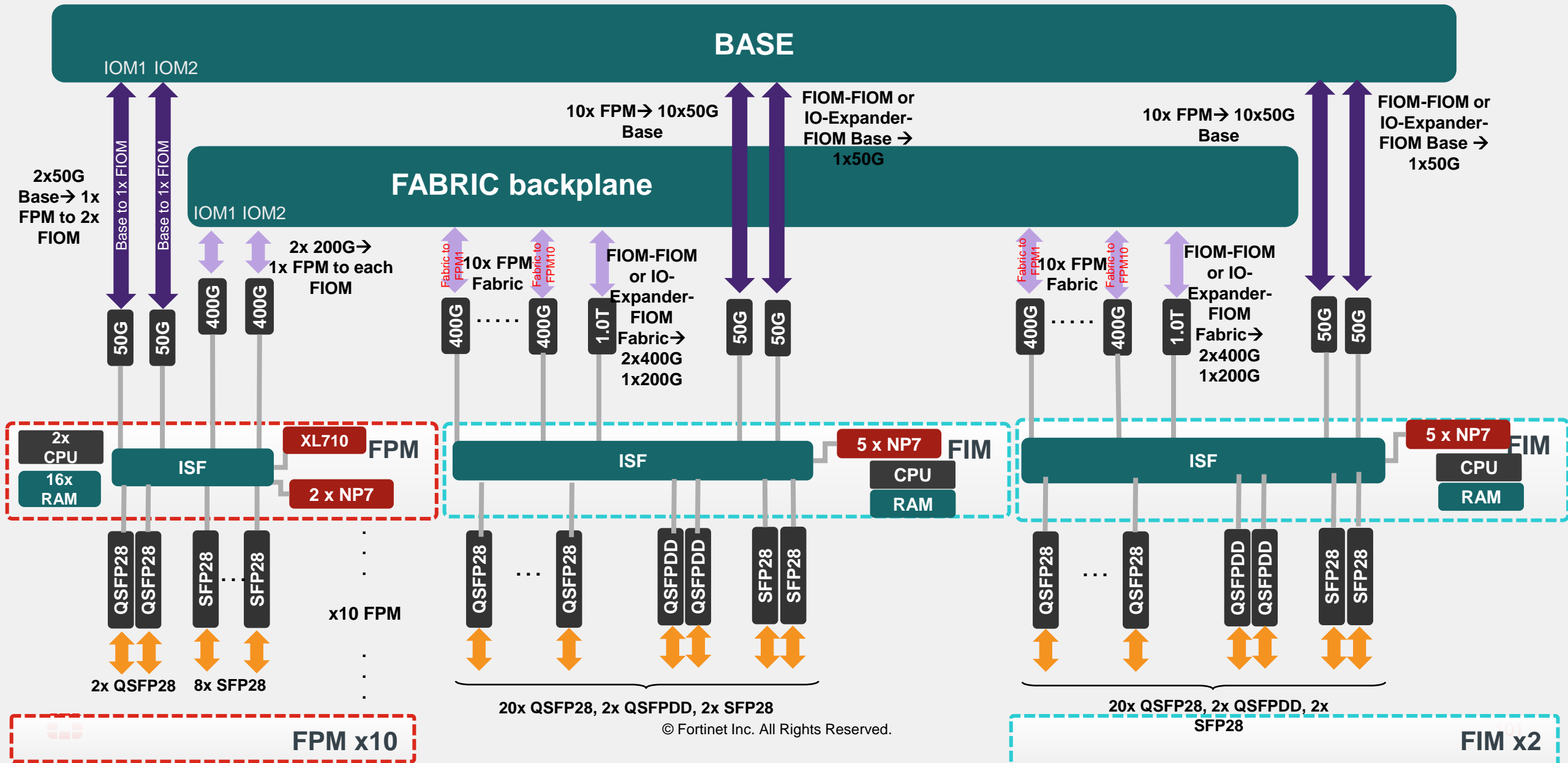
FIM-7941F Schematic



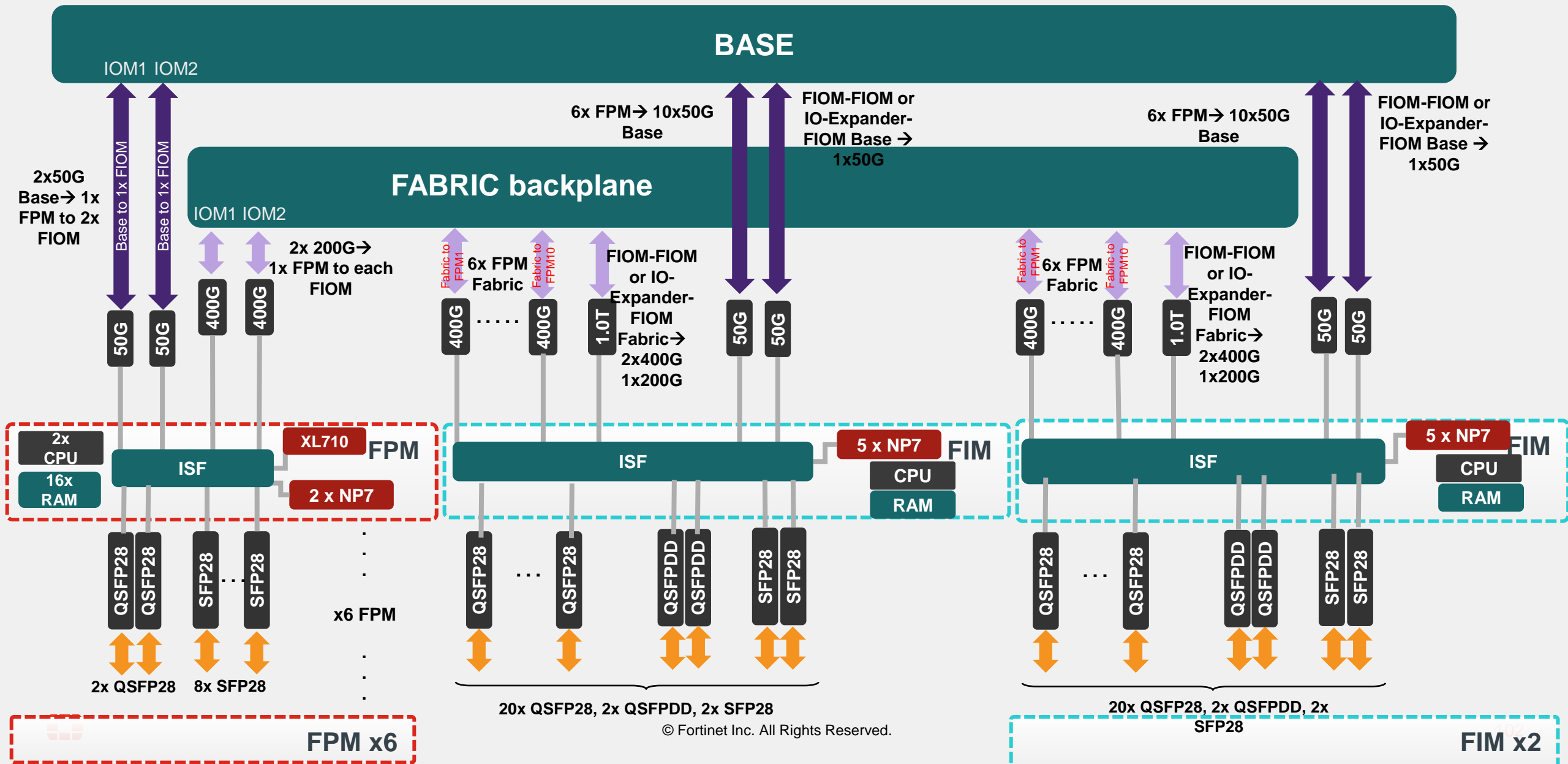
based on FIM-7921F but changing the switch chip from BCM56980 to Marvell Falcon 98CX8580 which provides more completed features



FG-7121F Schematic



FG-7081F Schematic

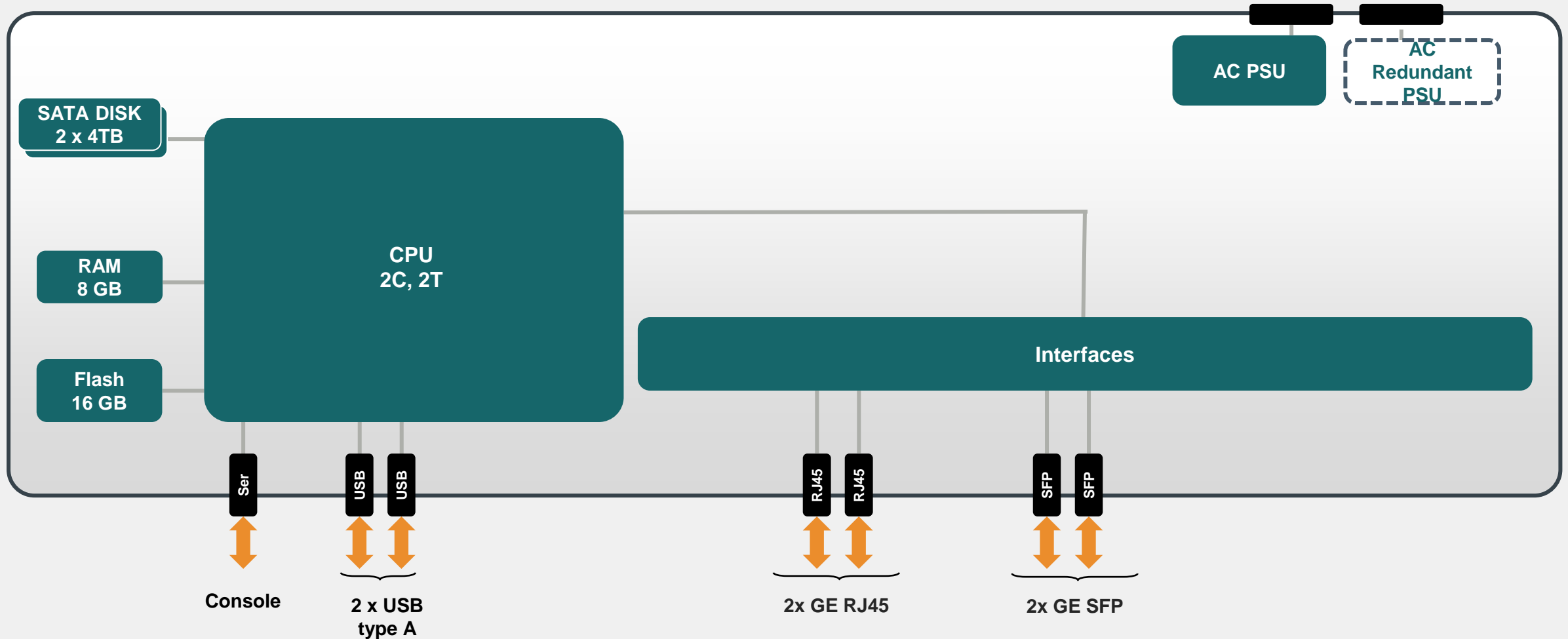




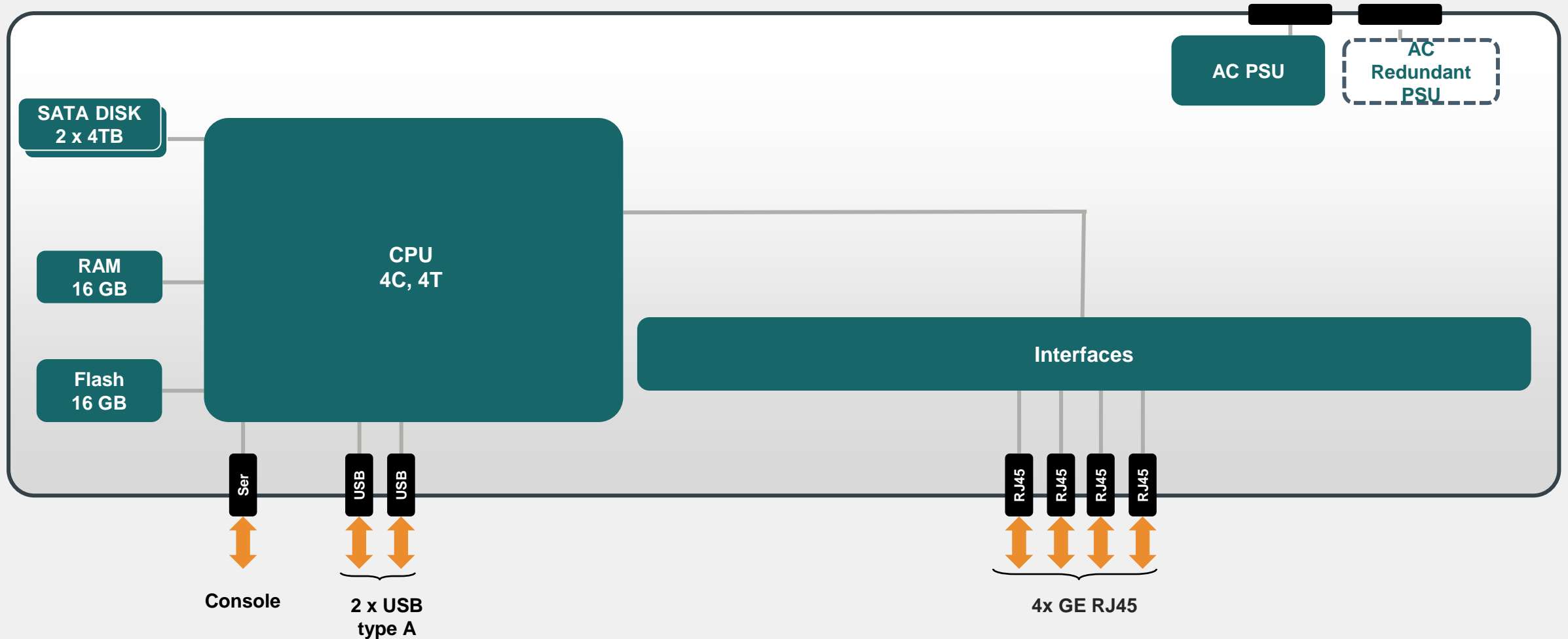
FortiManager



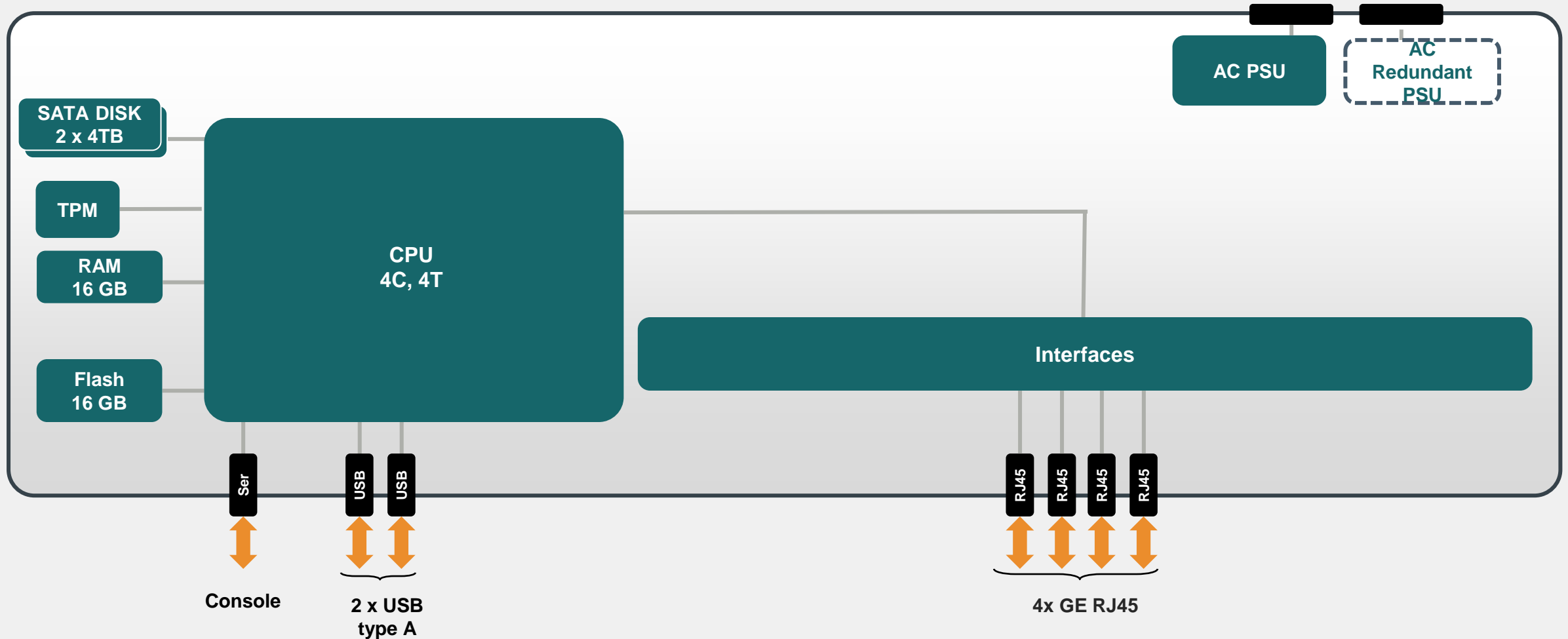
FortiManager 200F Schematic



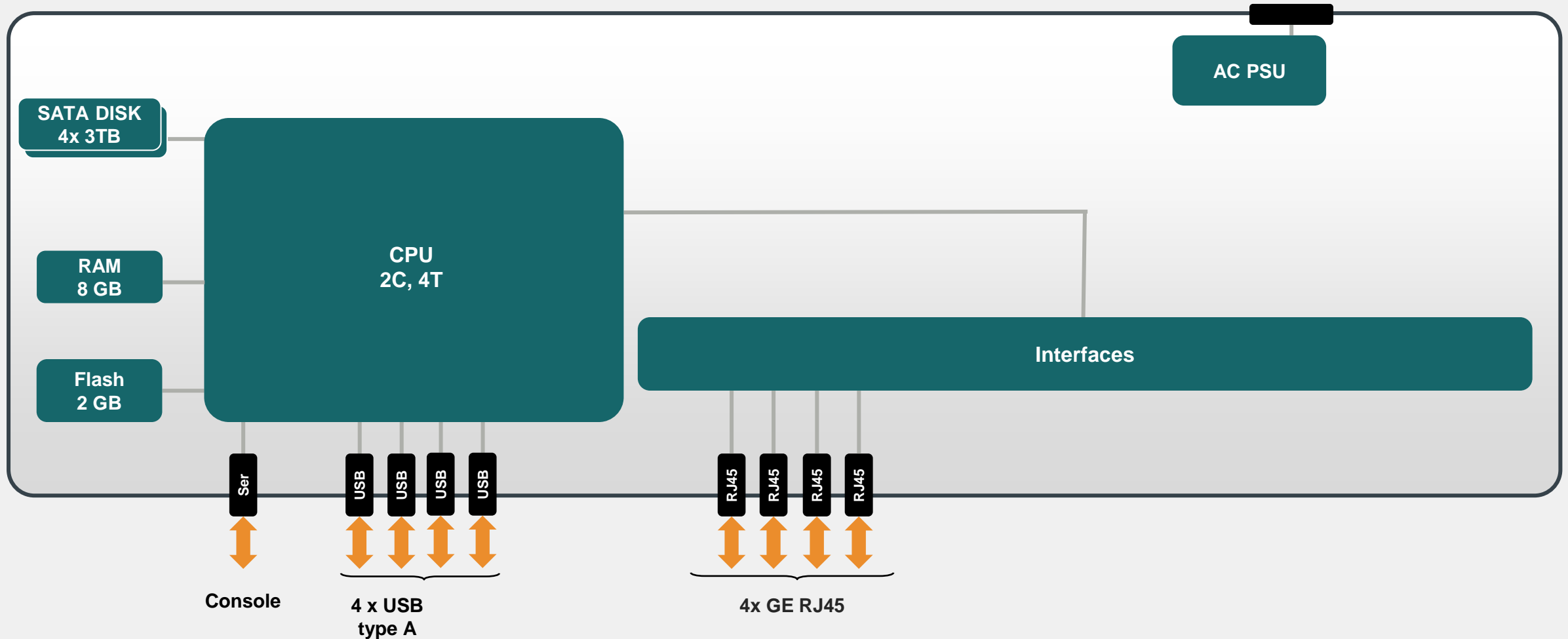
FortiManager 200G Schematic



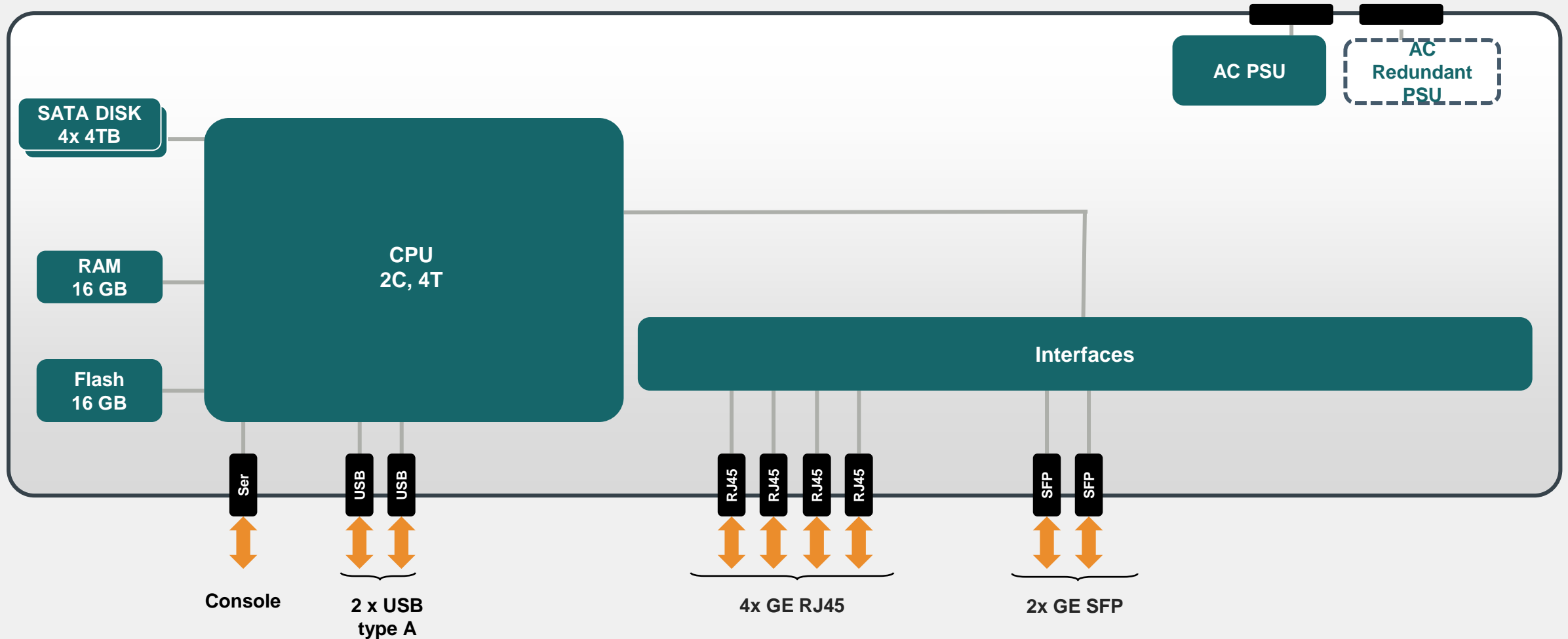
FortiManager 200G Gen2 Schematic



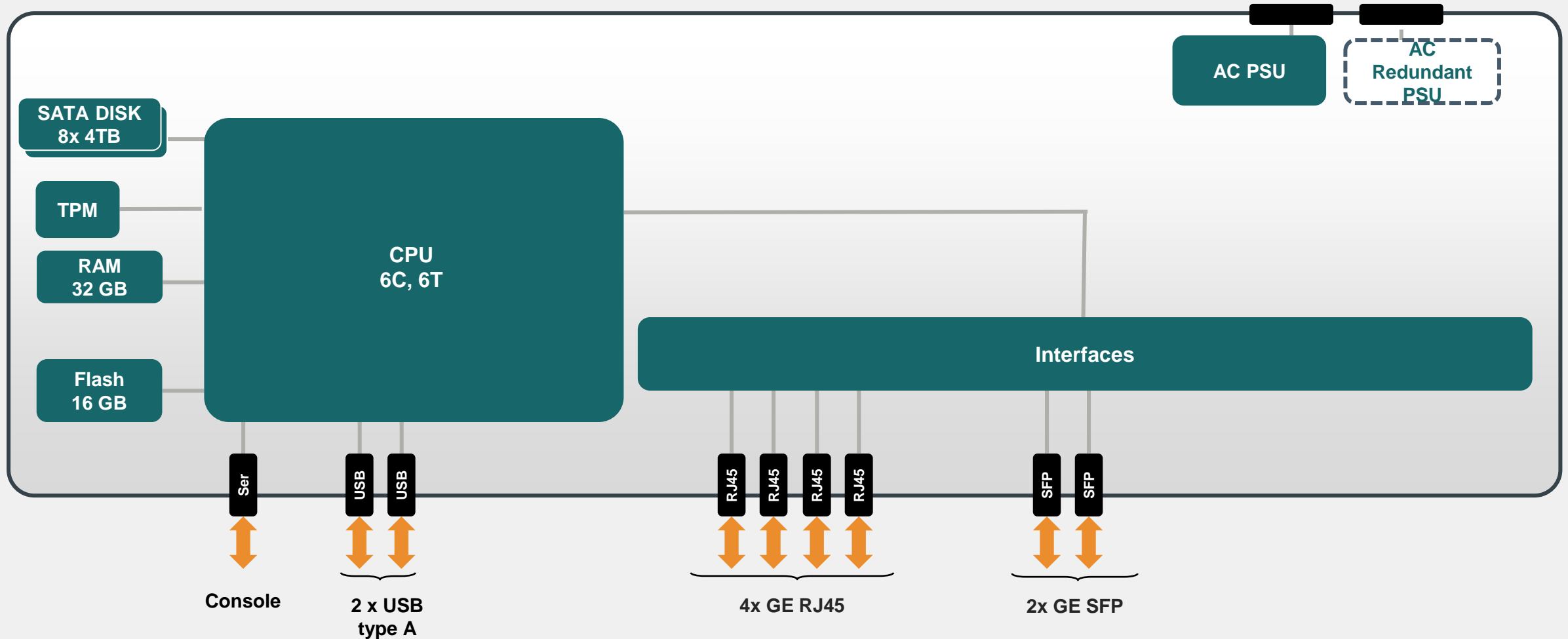
FortiManager 300E Schematic



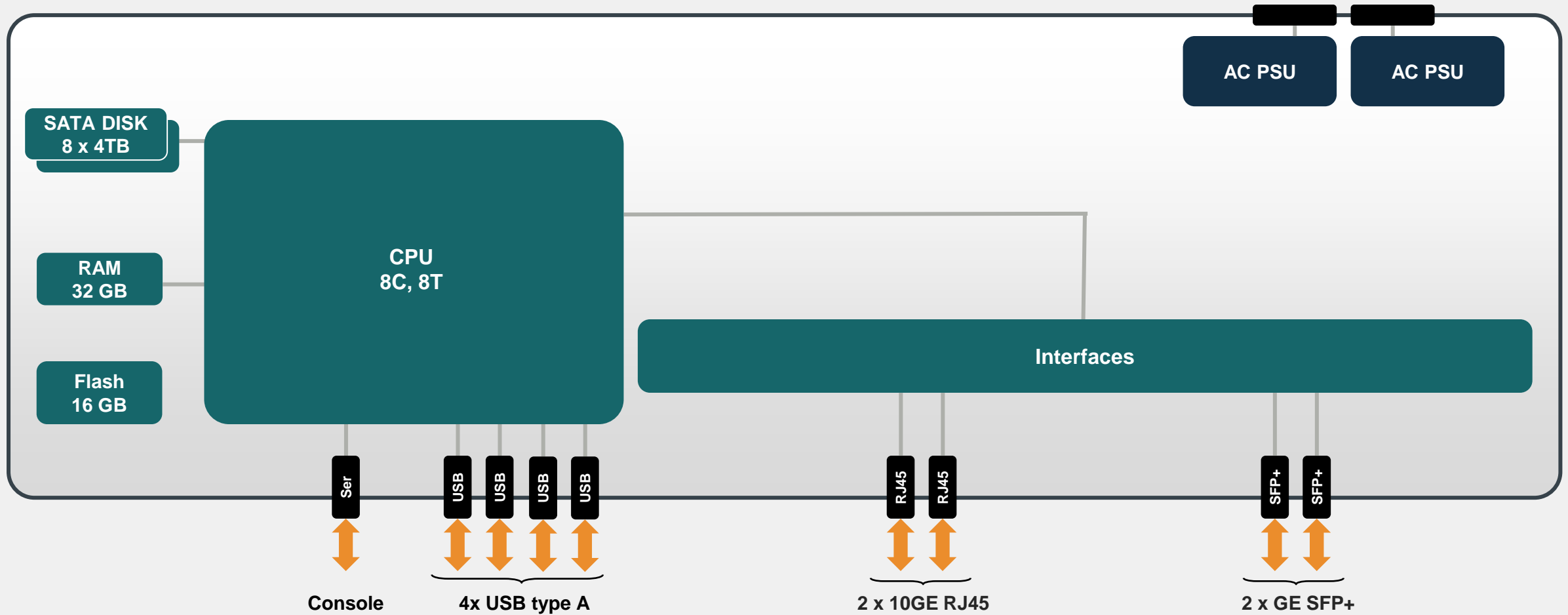
FortiManager 300F Schematic



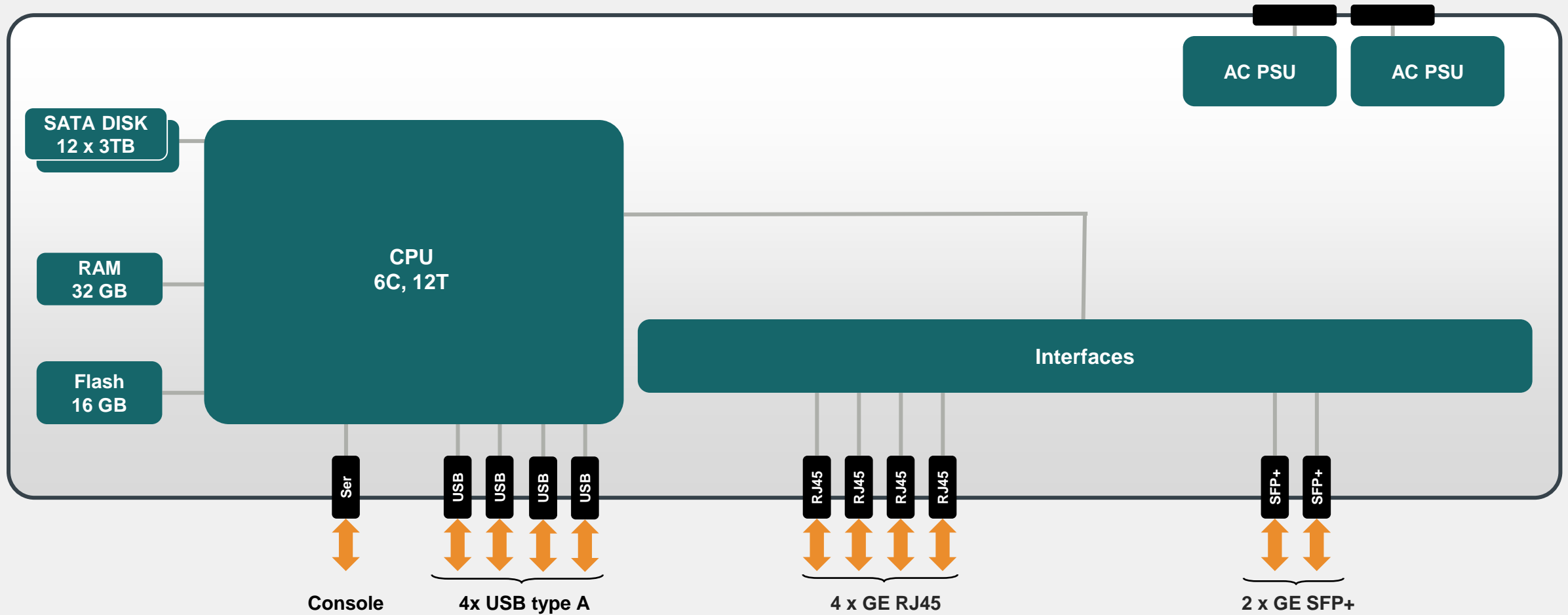
FortiManager 400/410G Schematic



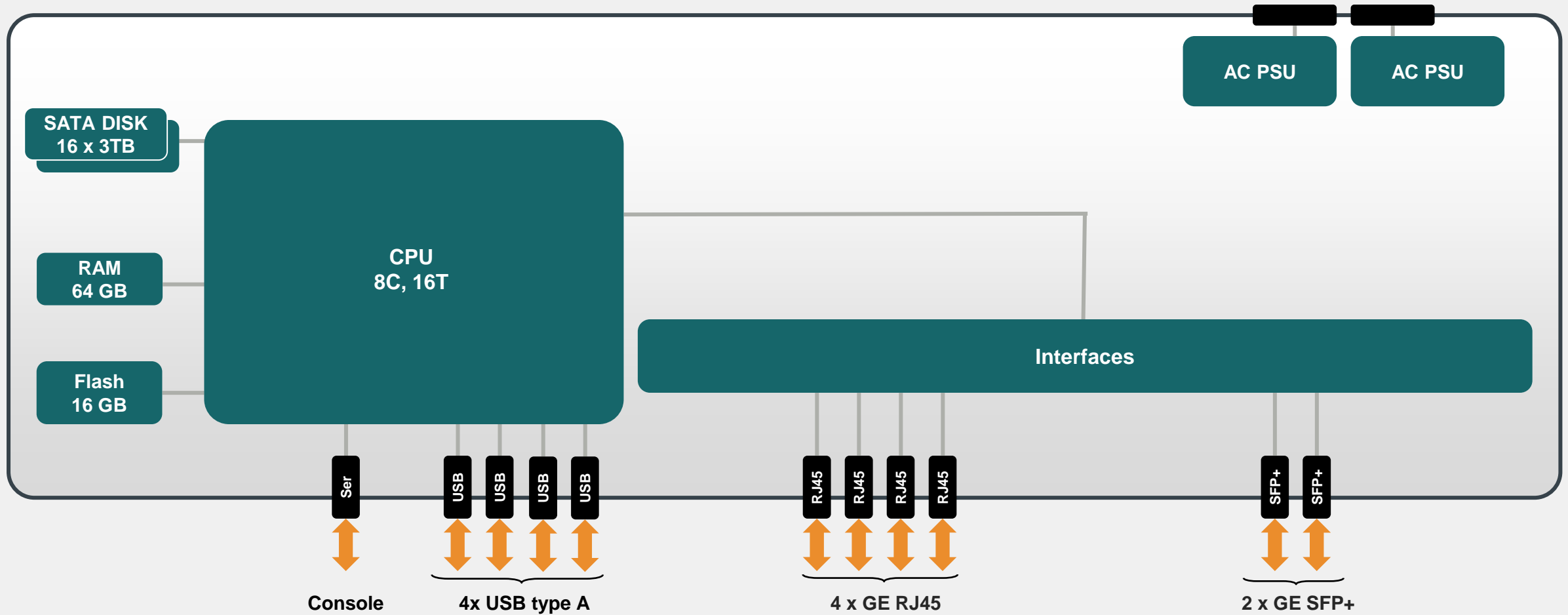
FortiManager 1000F Schematic



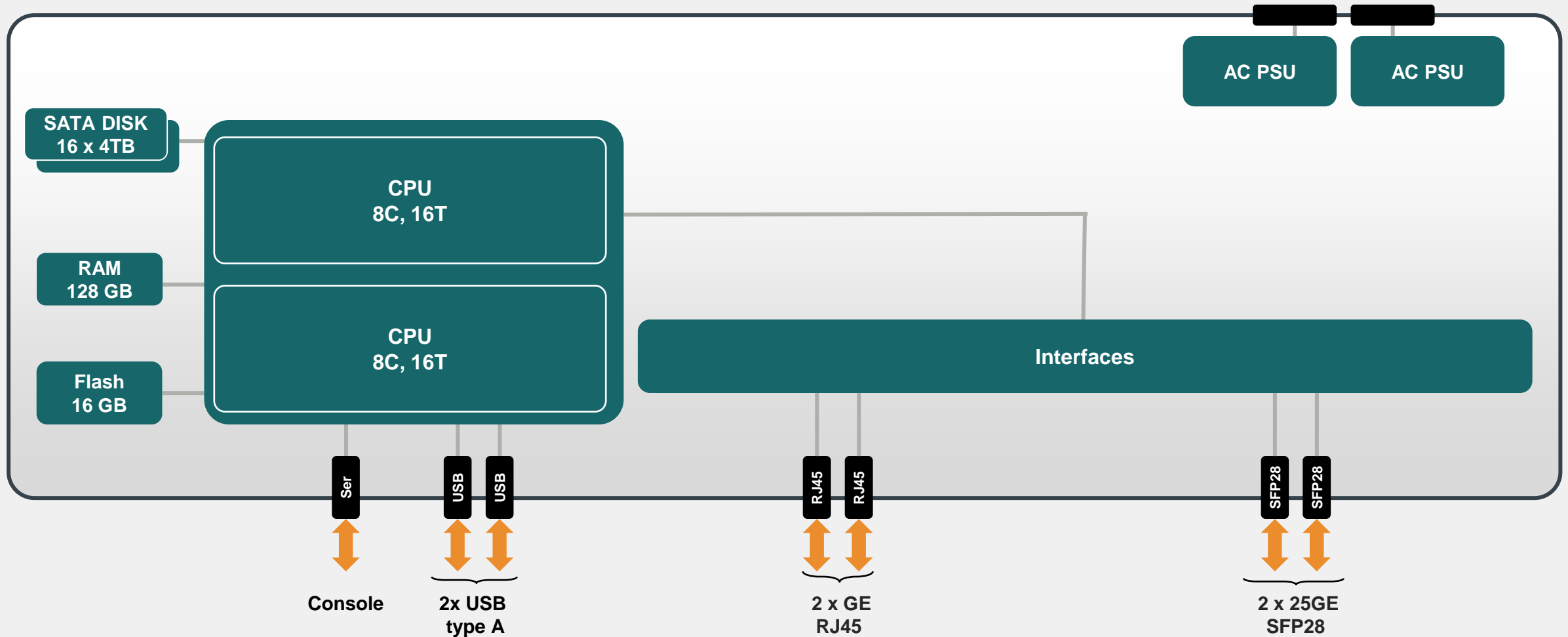
FortiManager 2000E Schematic



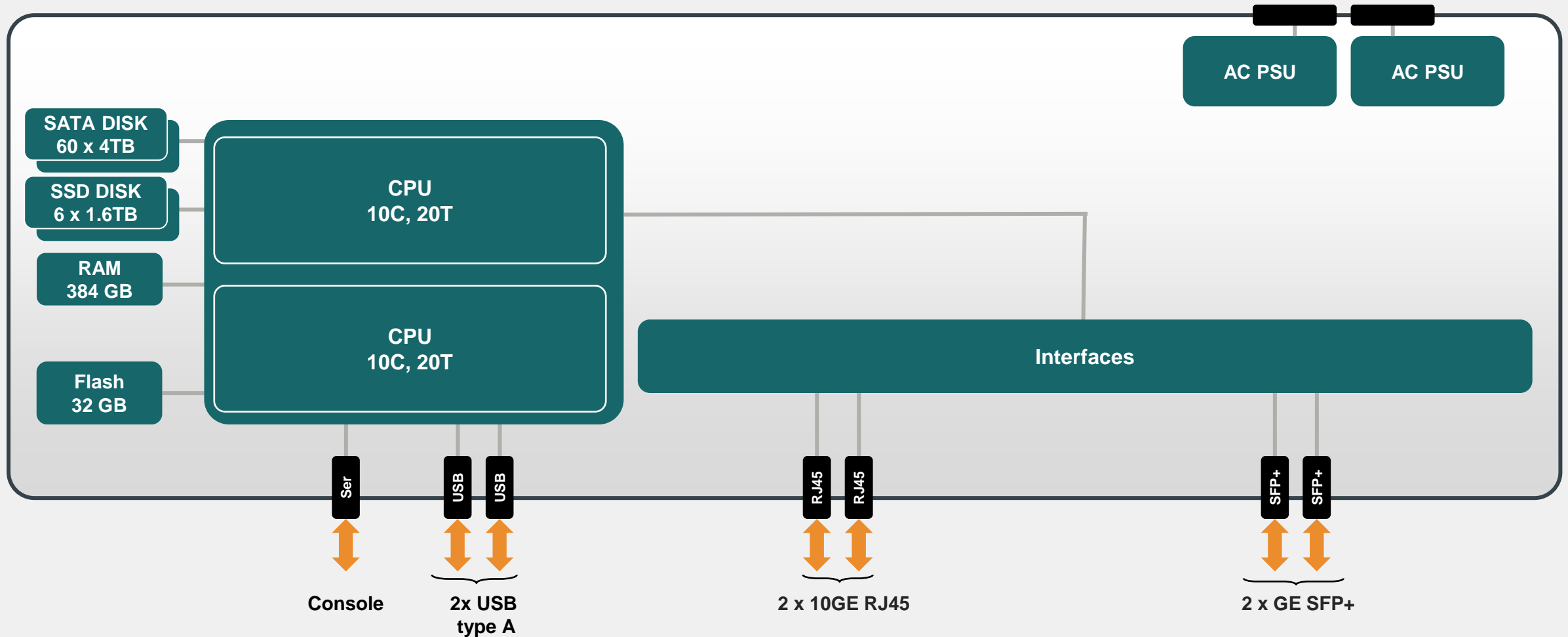
FortiManager 3000F Schematic



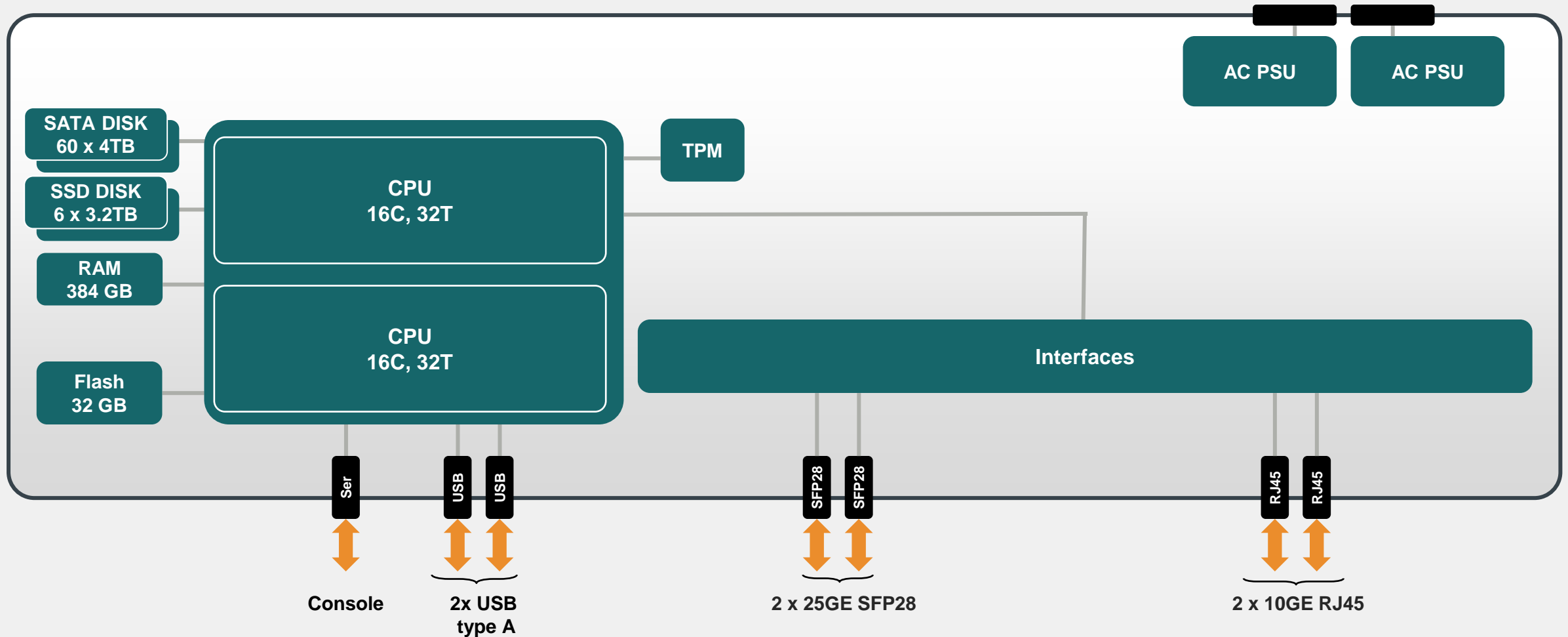
FortiManager 3000G Schematic



FortiManager 3700F Schematic



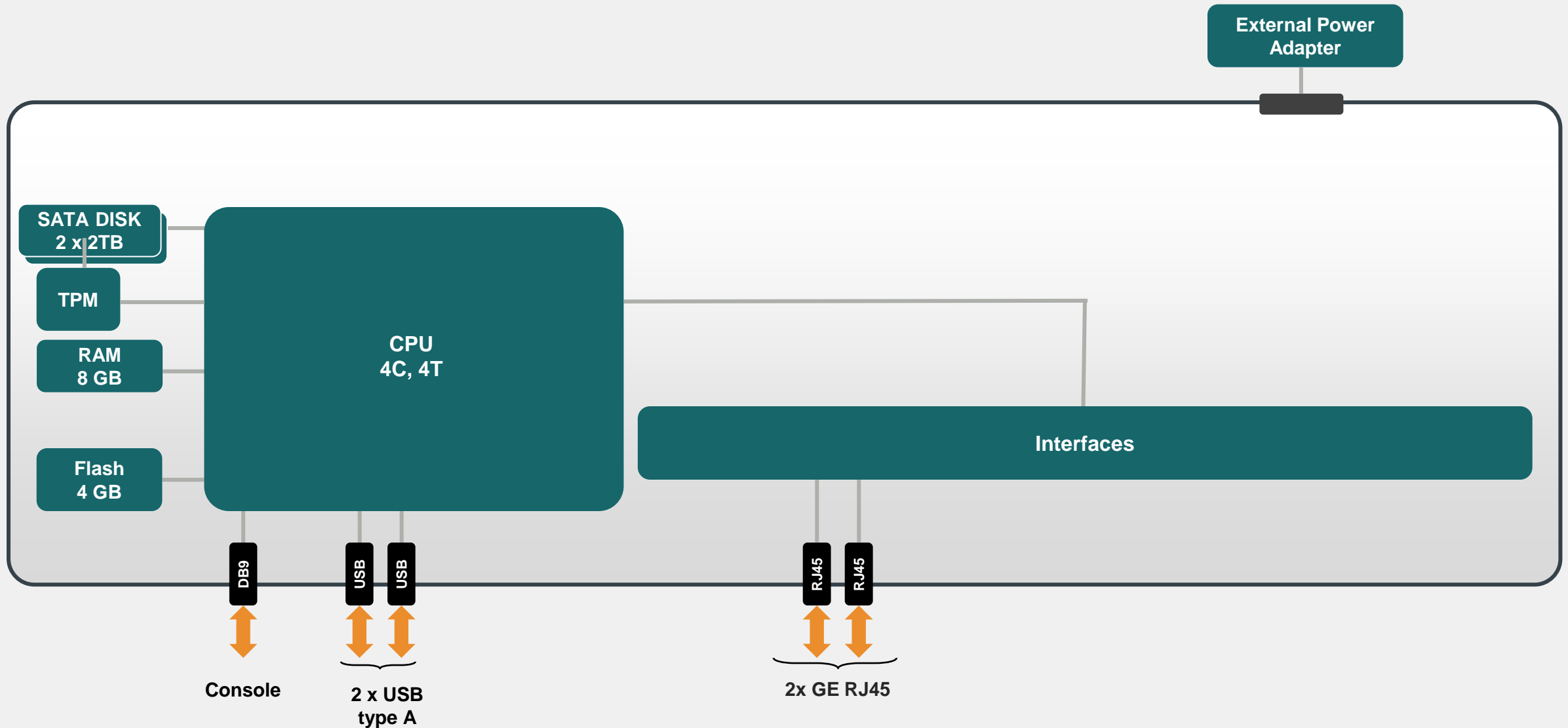
FortiManager 3700G Schematic



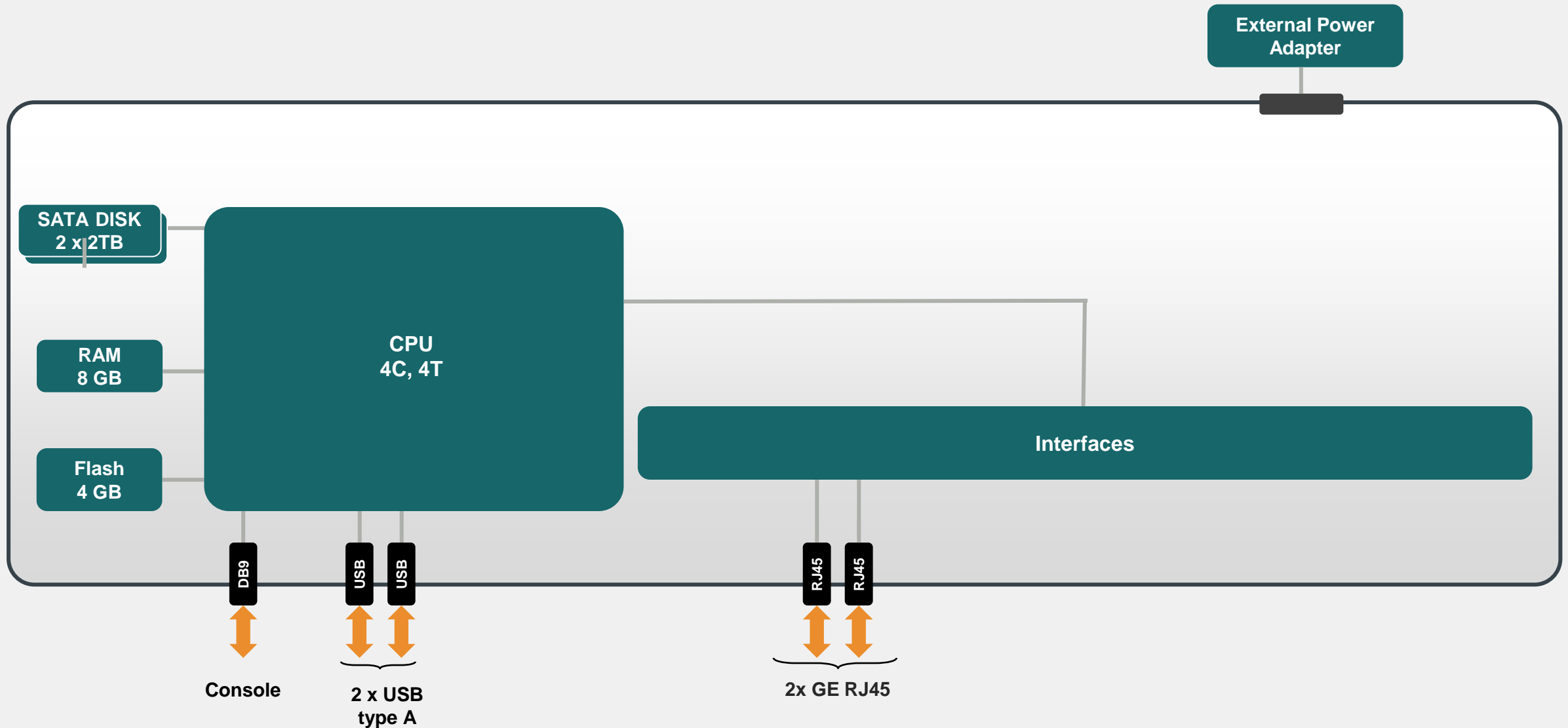
FortiAnalyzer



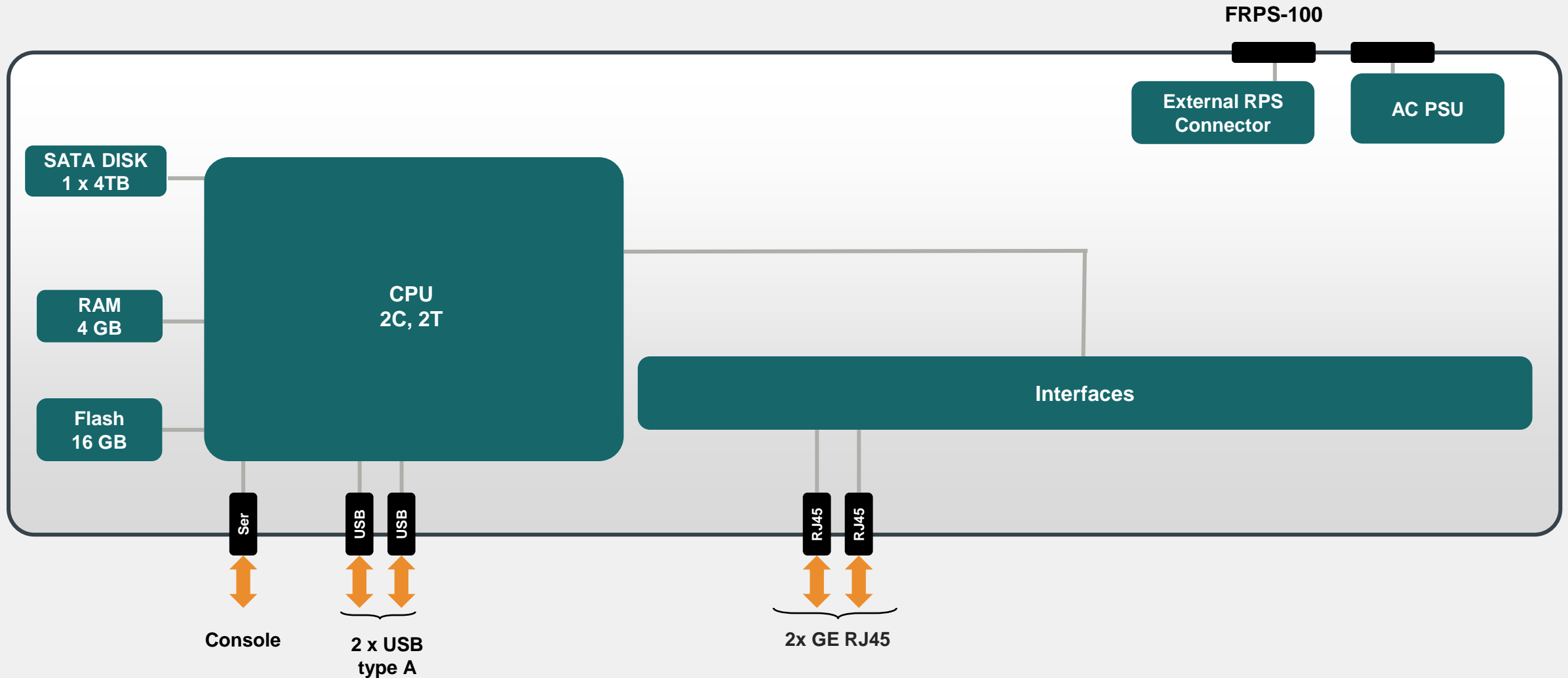
FortiAnalyzer 150G Schematic



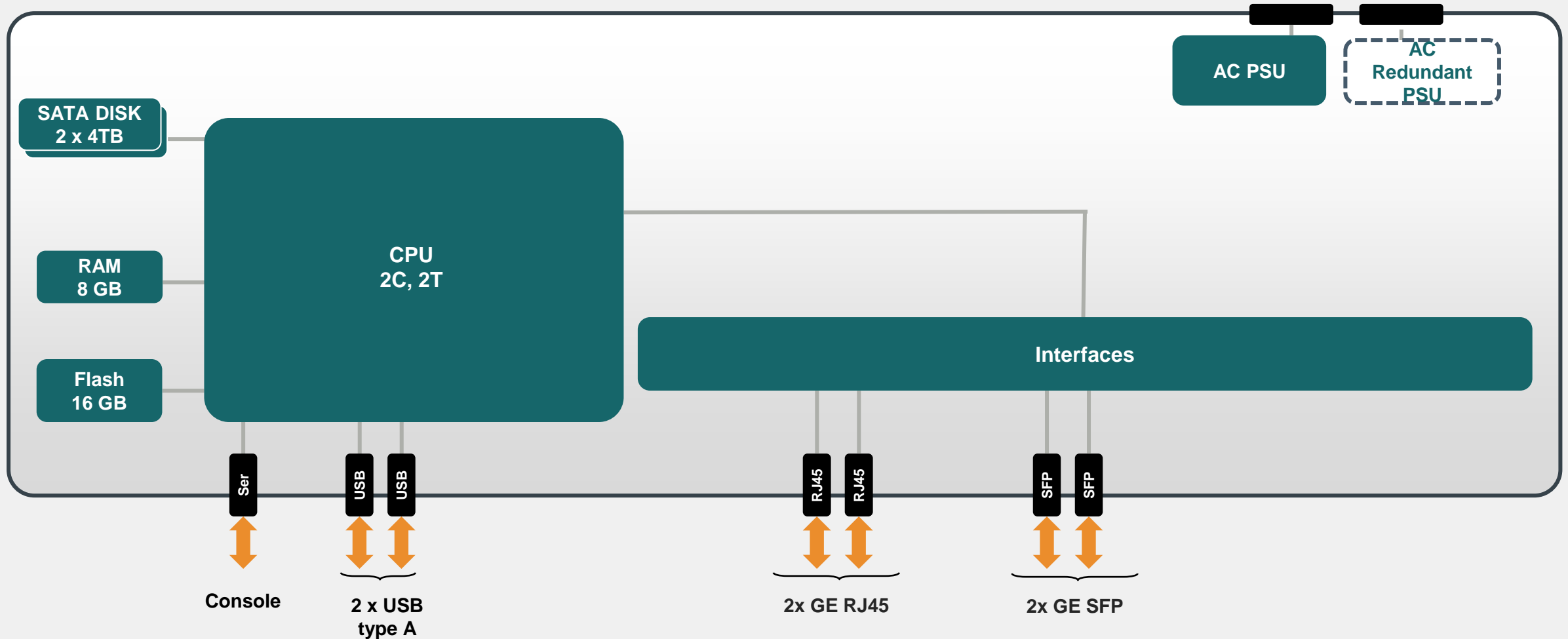
FortiAnalyzer 150G Gen2 Schematic



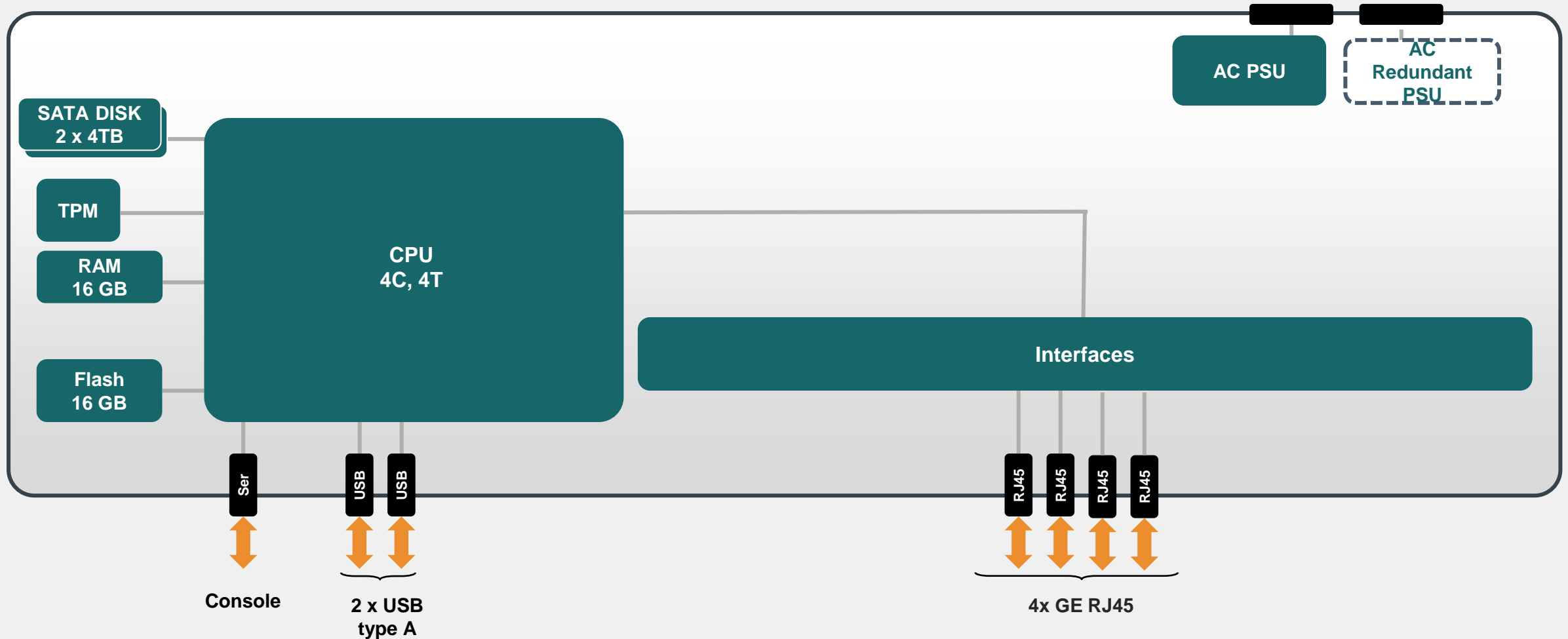
FortiAnalyzer 200F Schematic



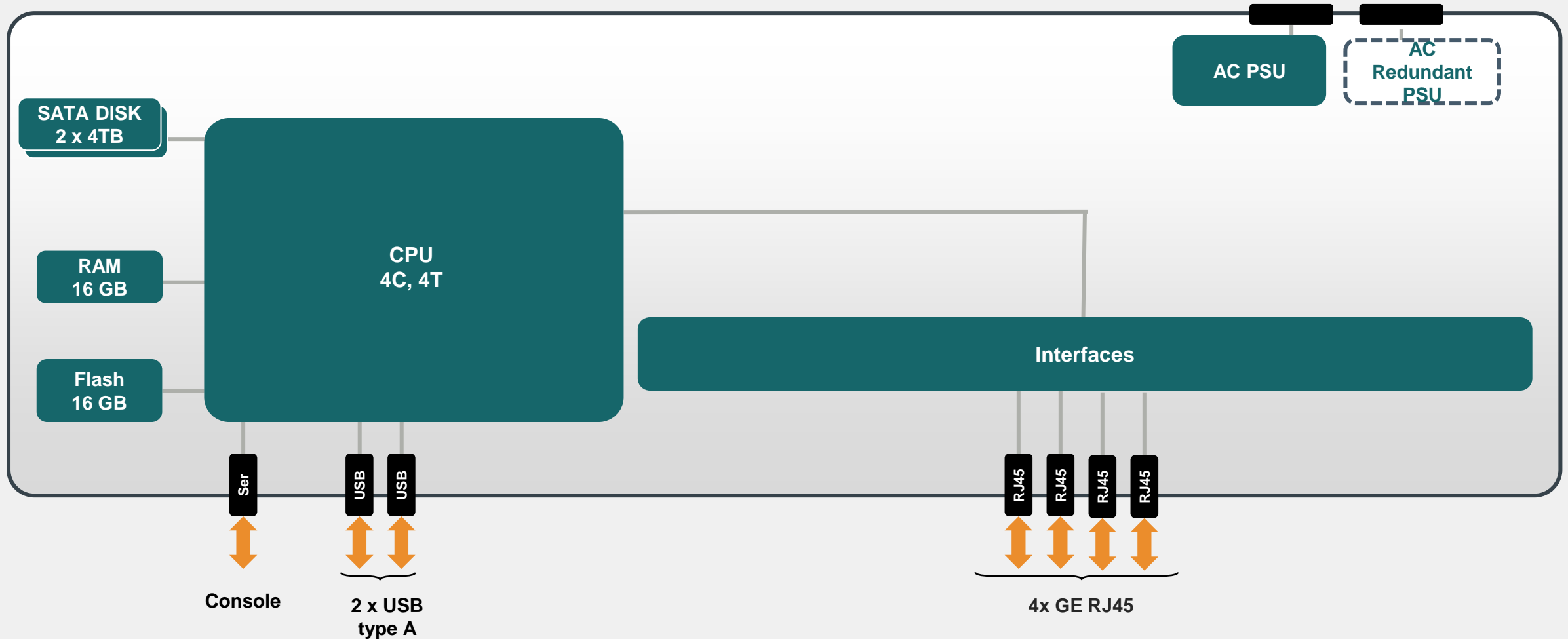
FortiAnalyzer 300F Schematic



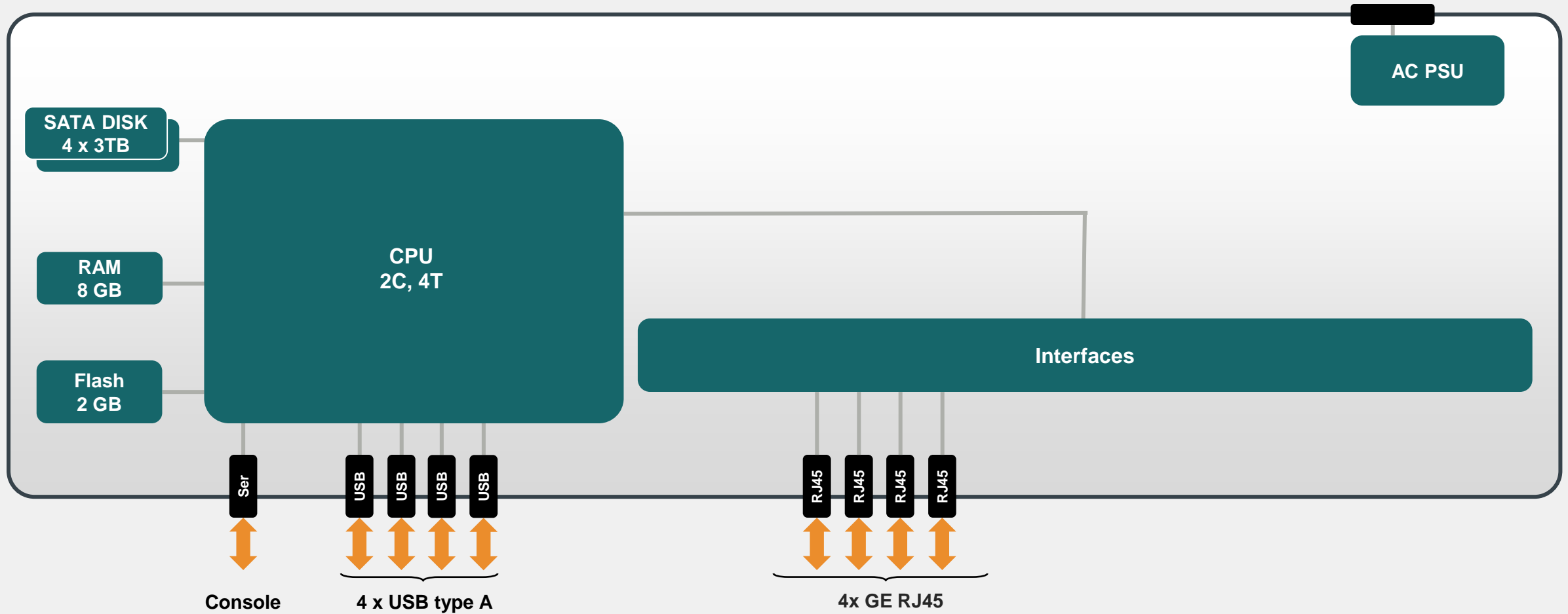
FortiAnalyzer 300G Schematic



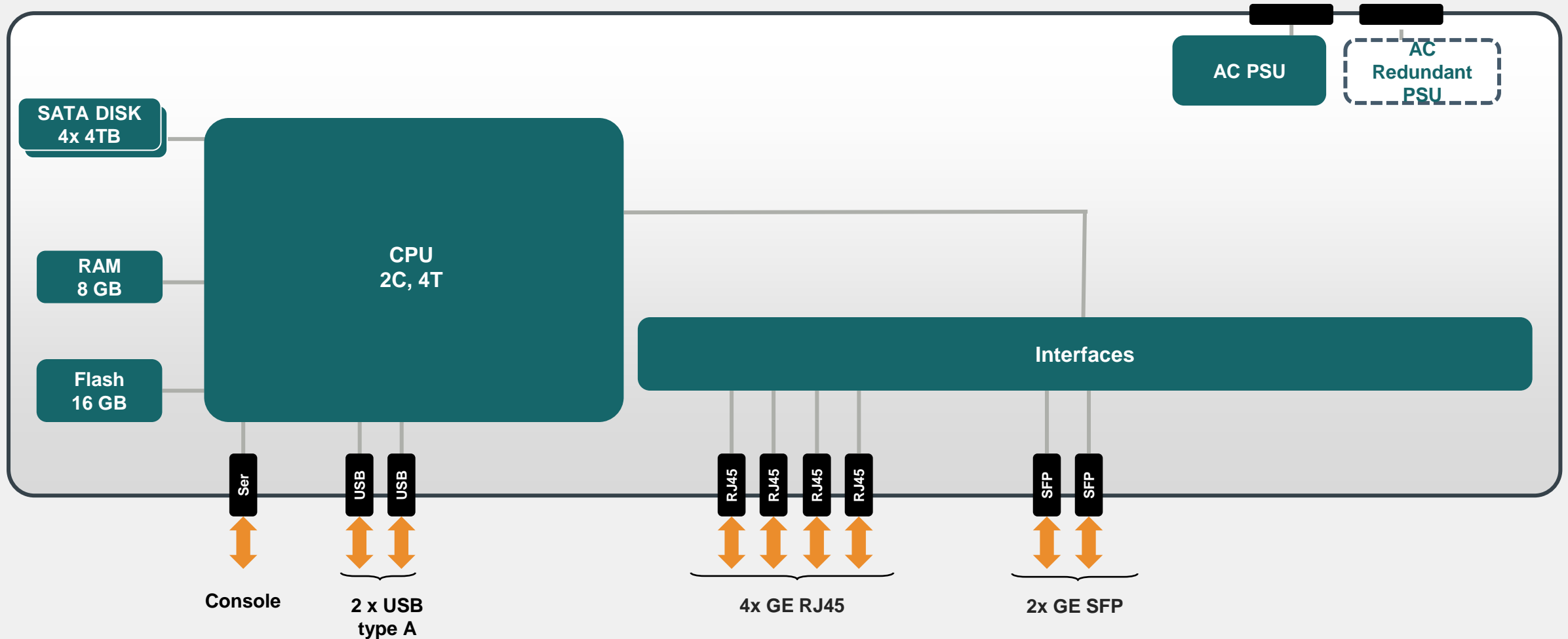
FortiAnalyzer 300G Gen2 Schematic



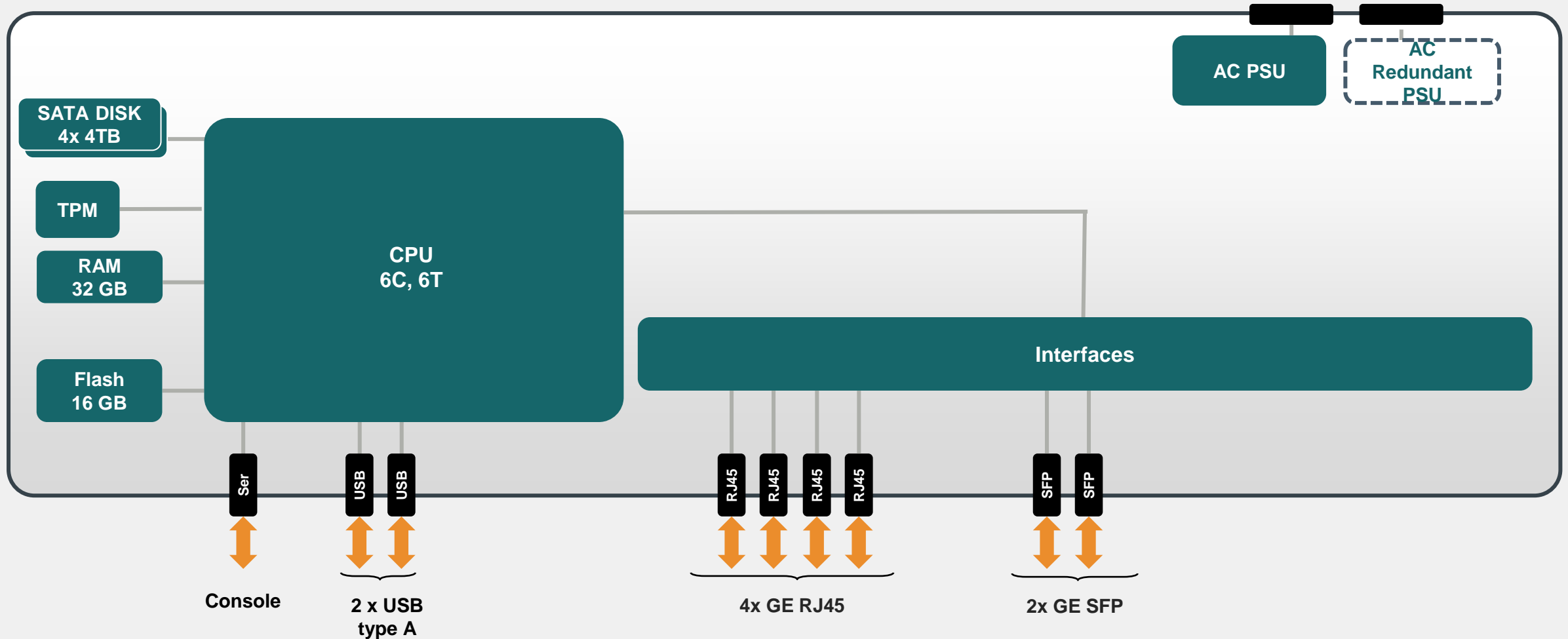
FortiAnalyzer 400E Schematic



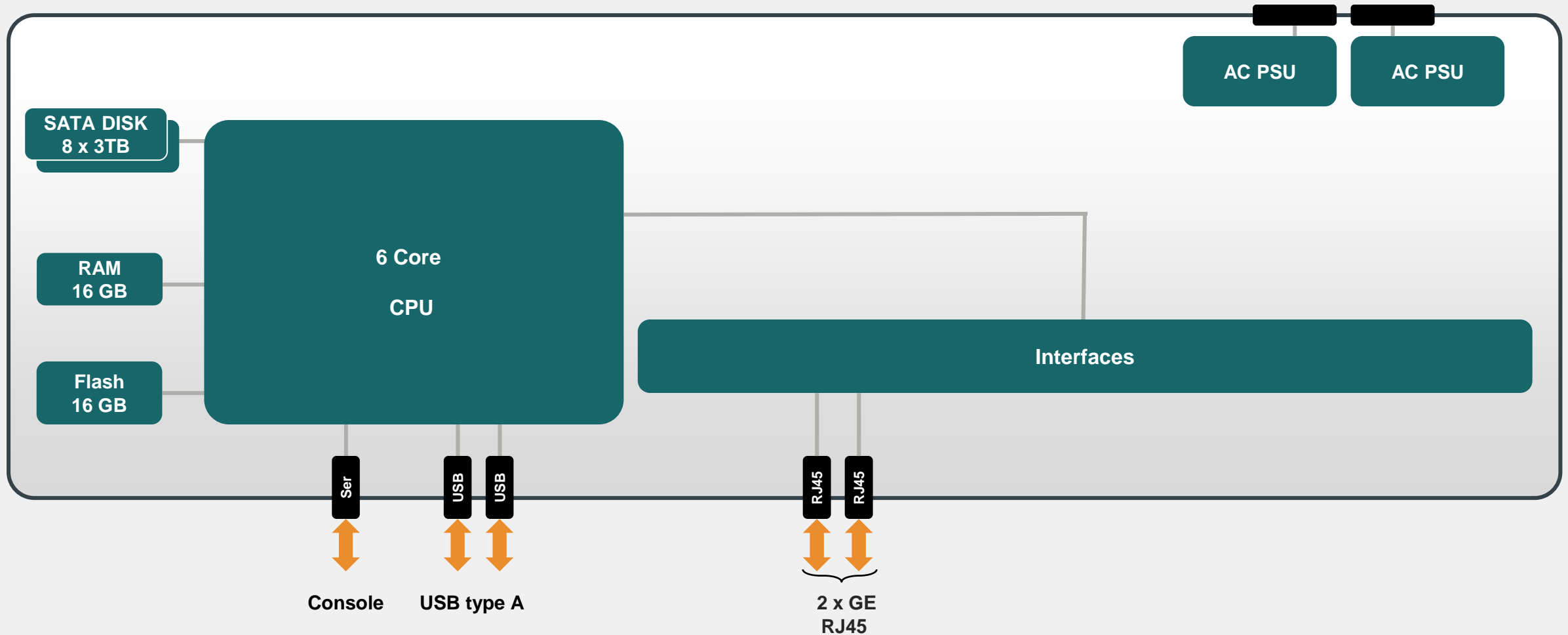
FortiAnalyzer 800F Schematic



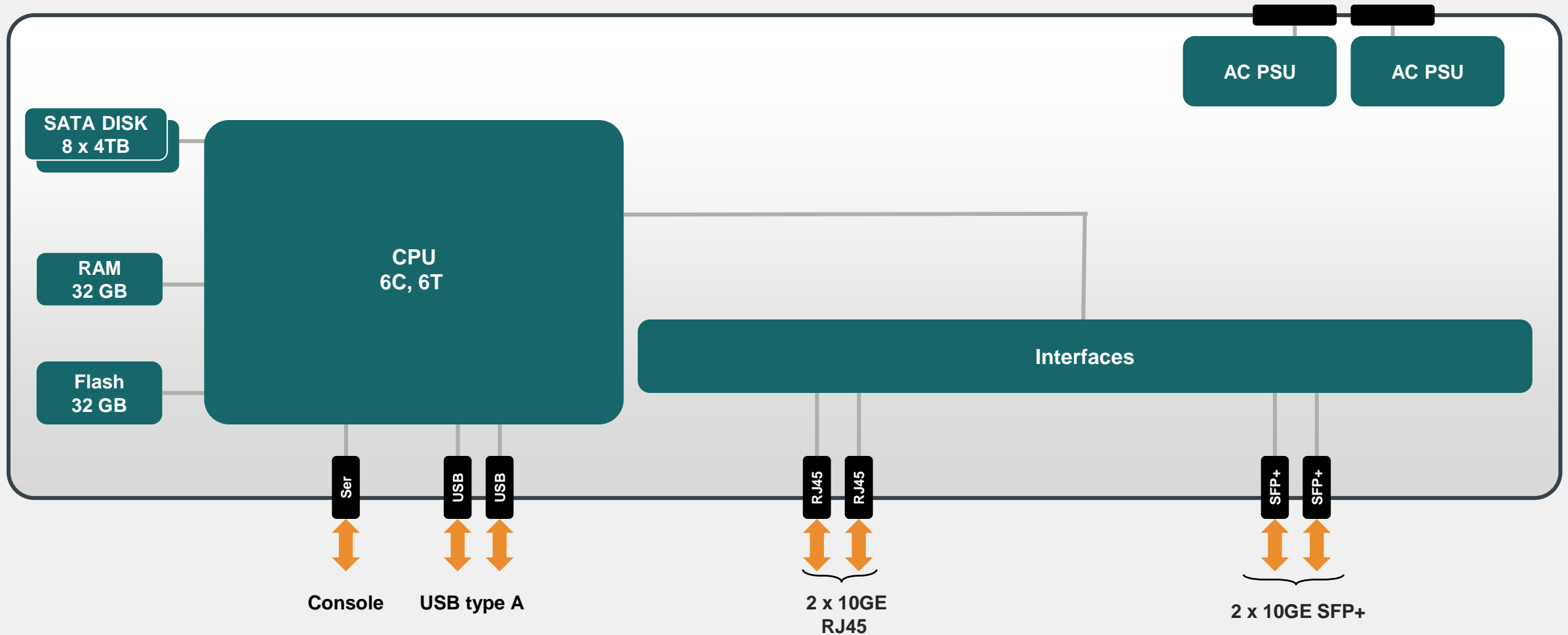
FortiAnalyzer 800G Schematic



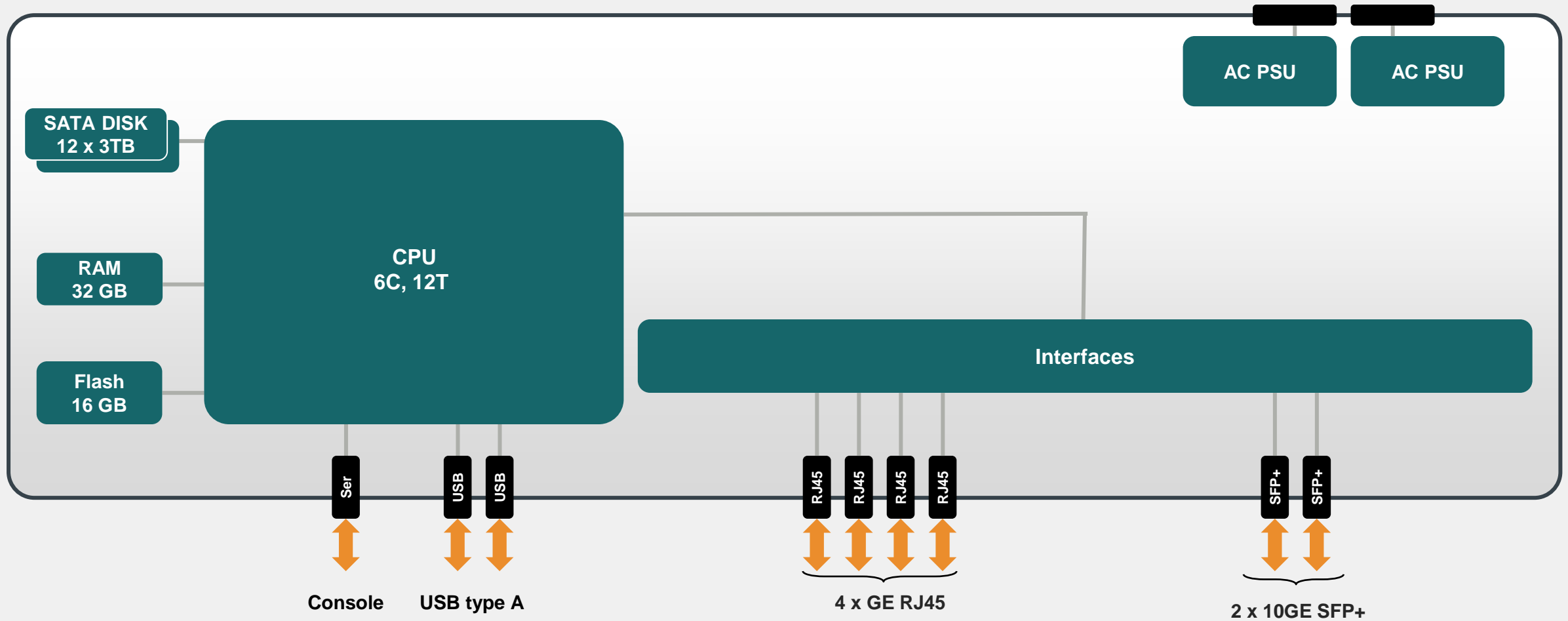
FortiAnalyzer 1000E Schematic



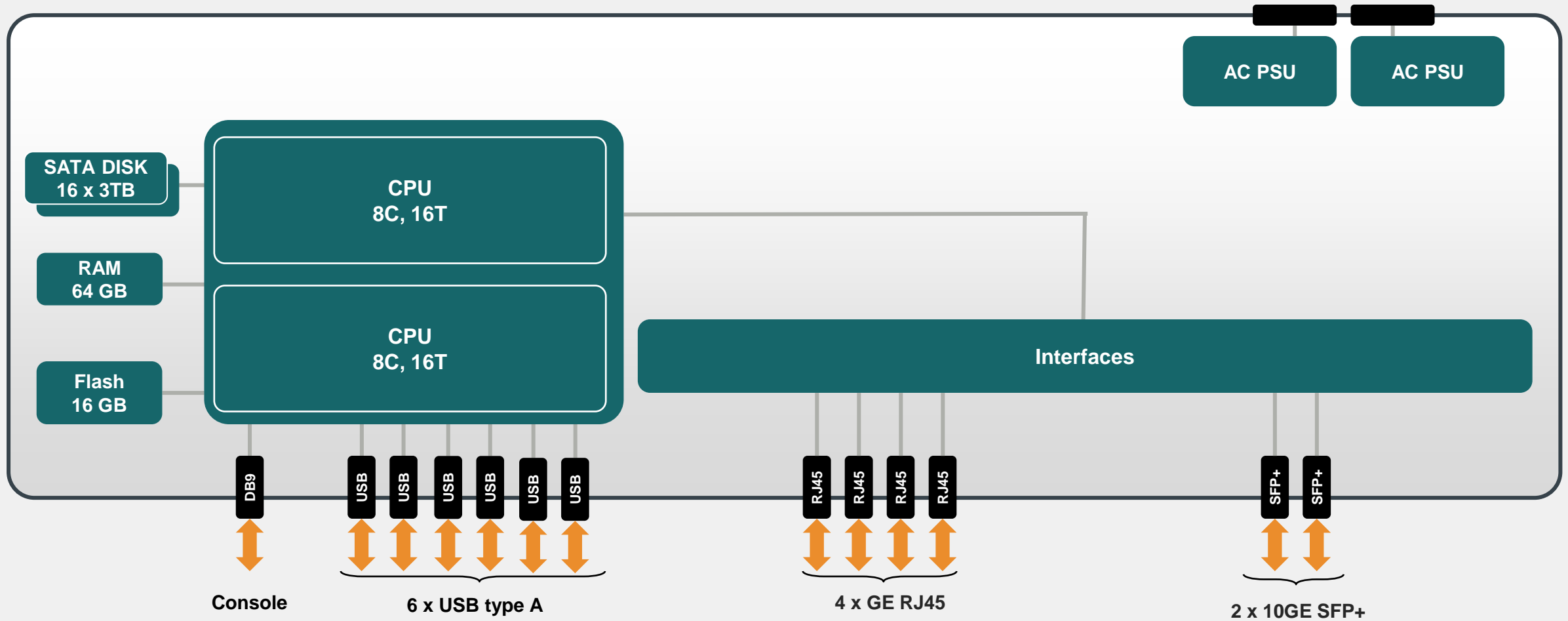
FortiAnalyzer 1000F Schematic



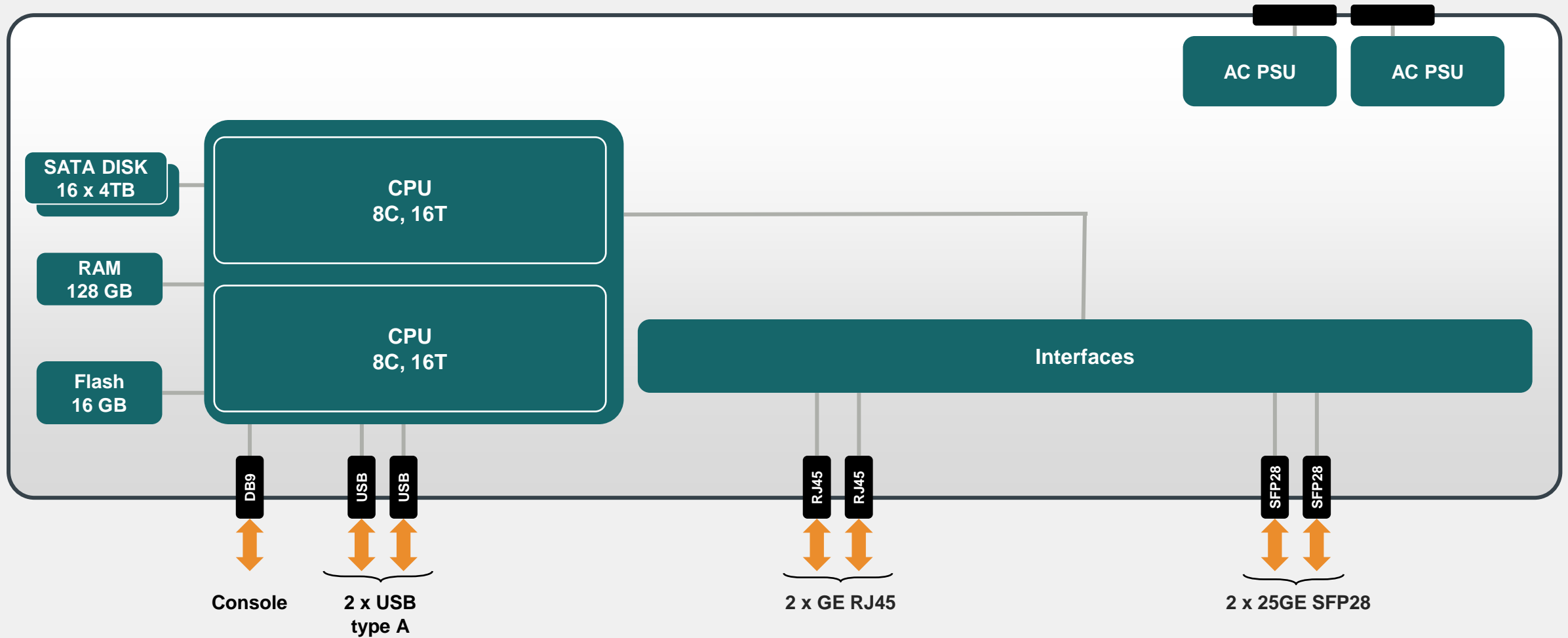
FortiAnalyzer 2000E Schematic



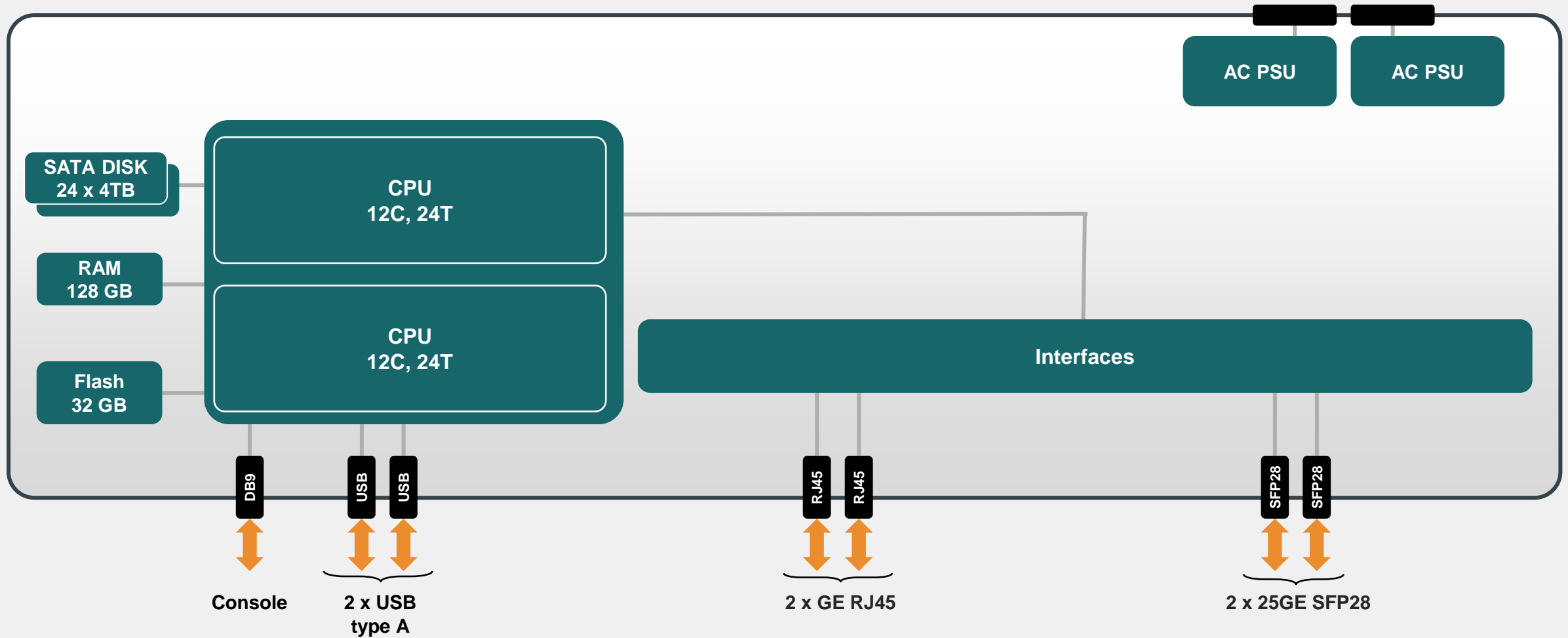
FortiAnalyzer 3000F Schematic



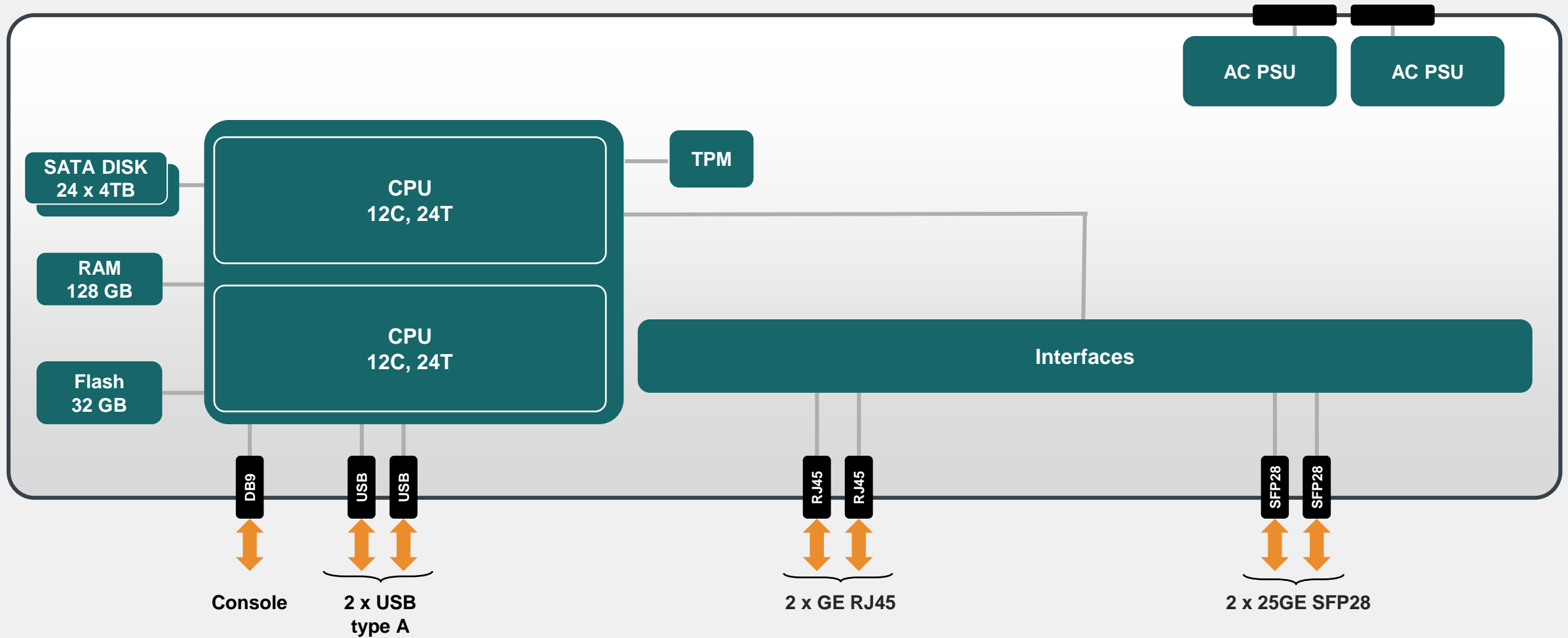
FortiAnalyzer 3000G Schematic



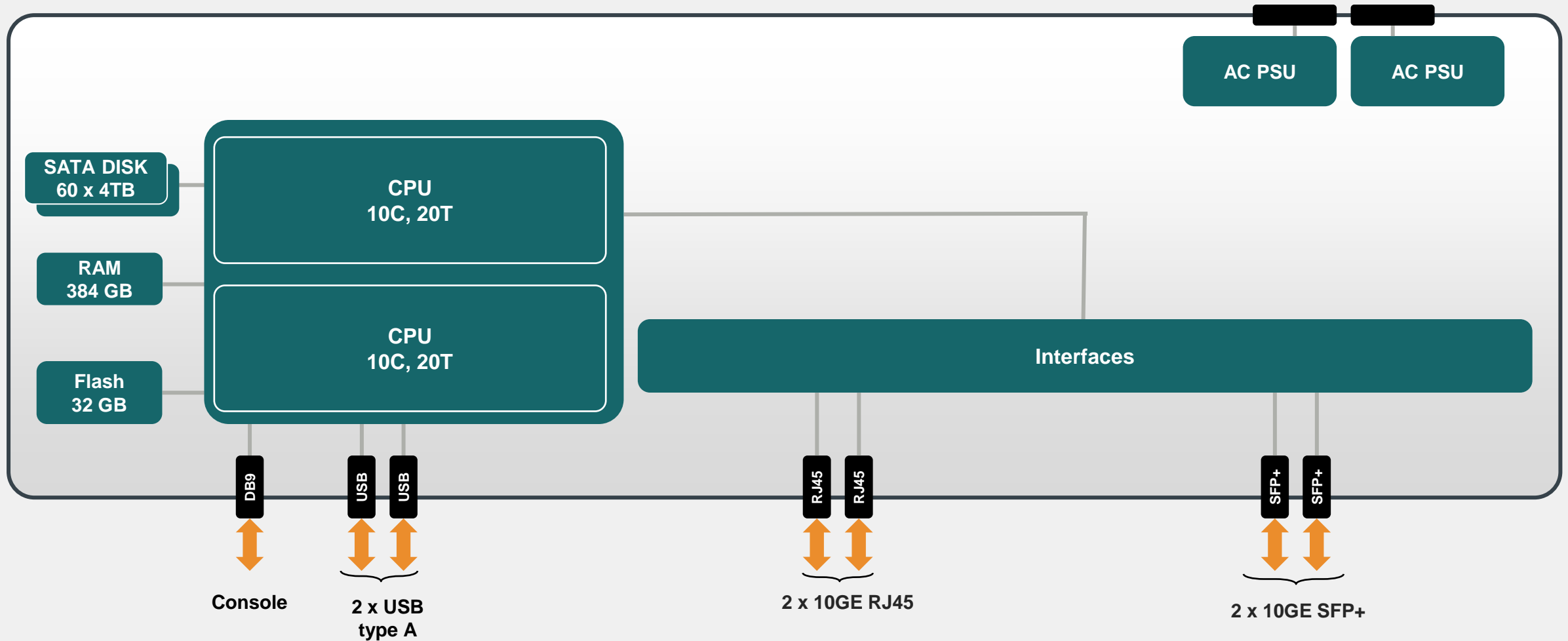
FortiAnalyzer 3500G Schematic



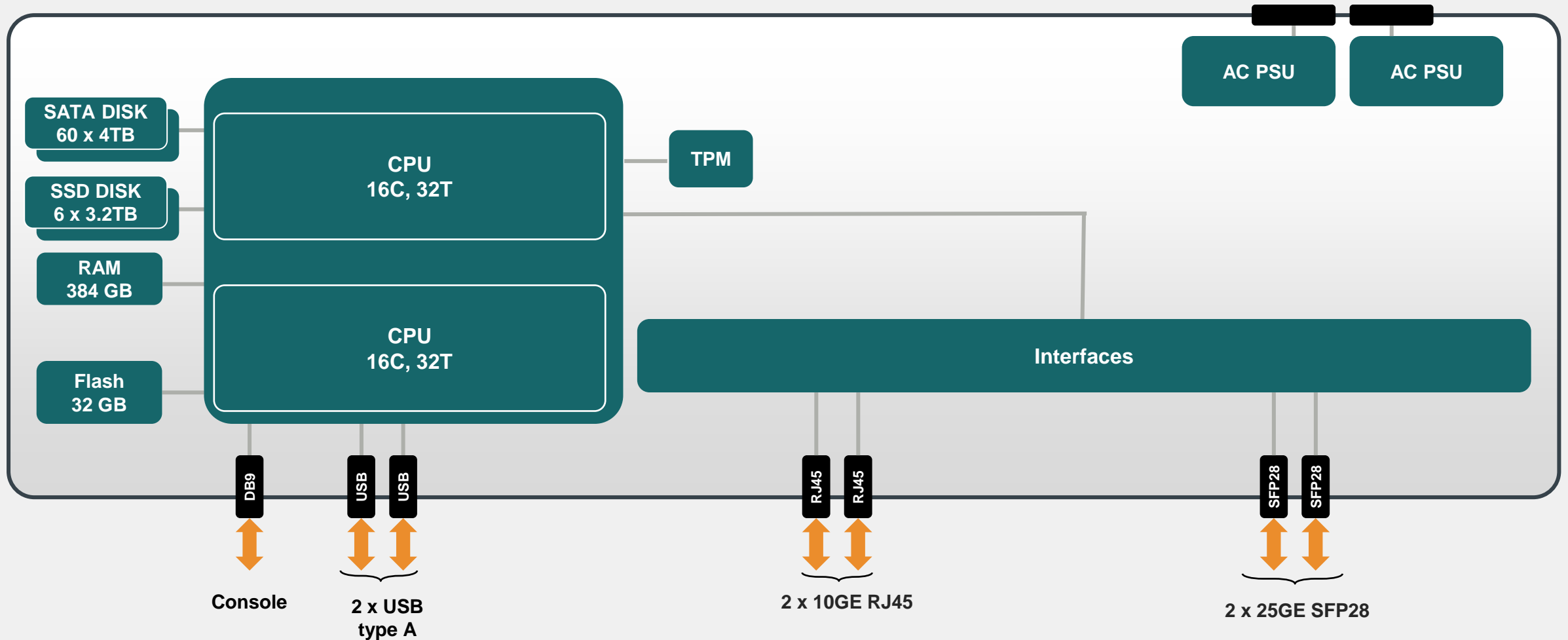
FortiAnalyzer 3500G Gen2 Schematic



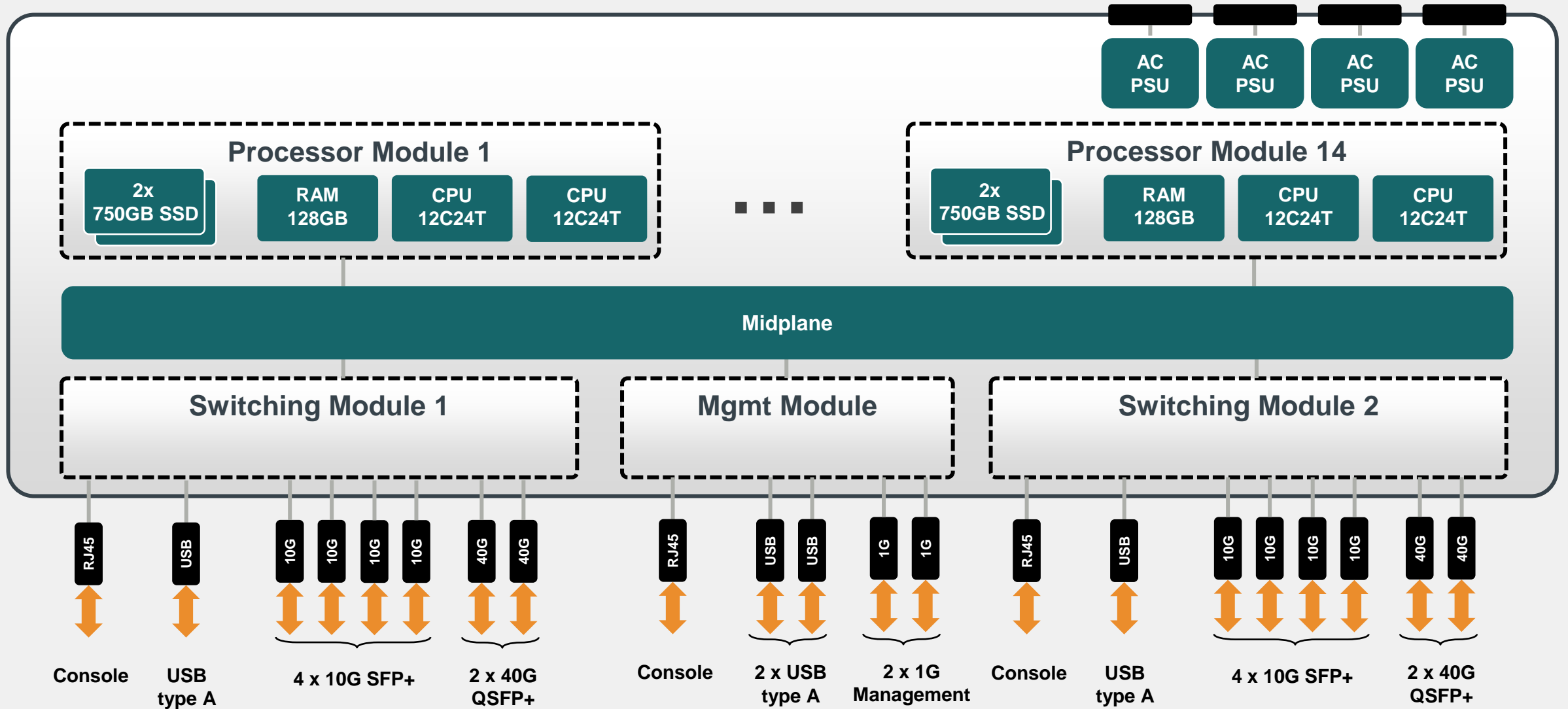
FortiAnalyzer 3700F Schematic



FortiAnalyzer 3700G Schematic



FortiAnalyzer BigData 4500F Schematic

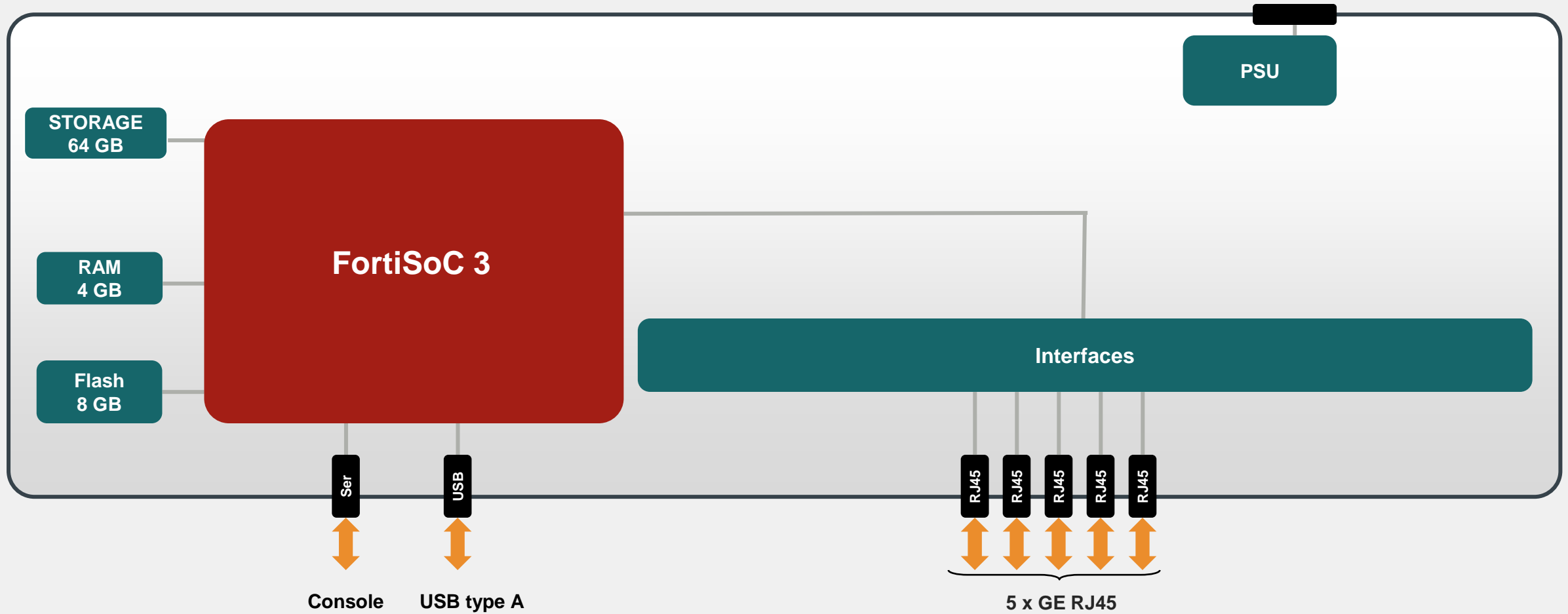




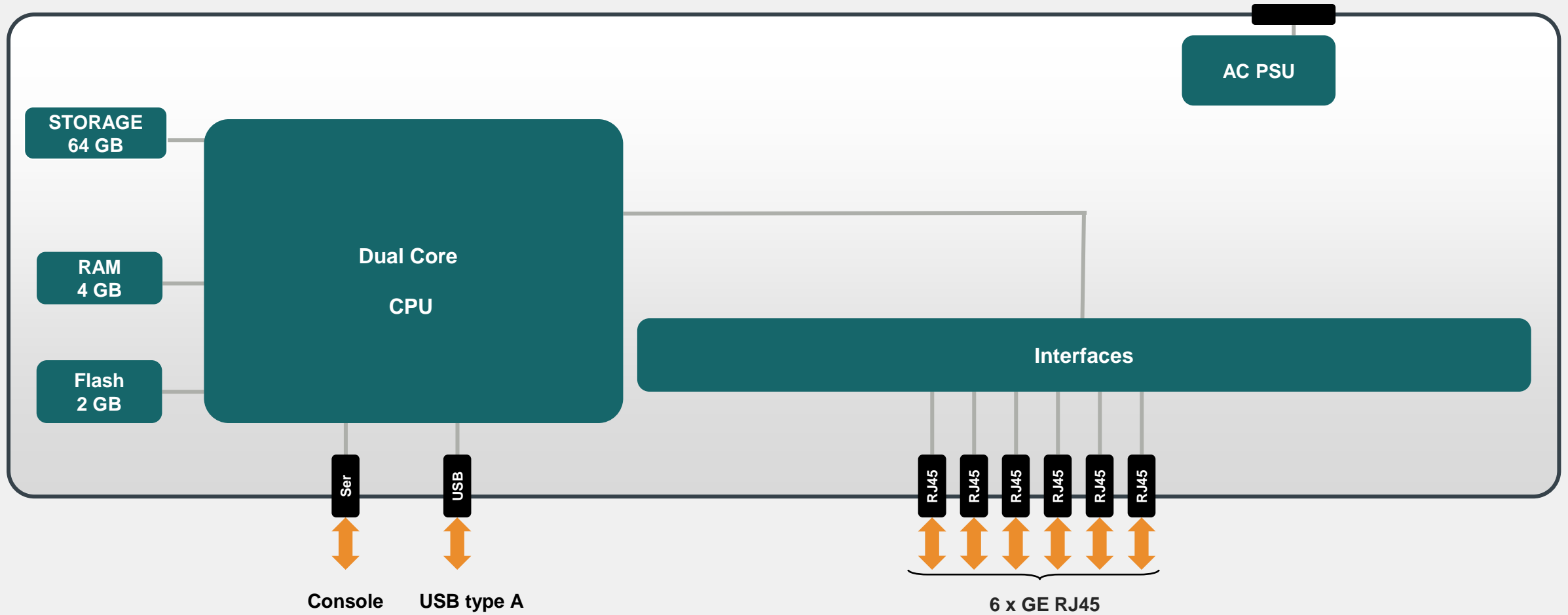
FortiADC



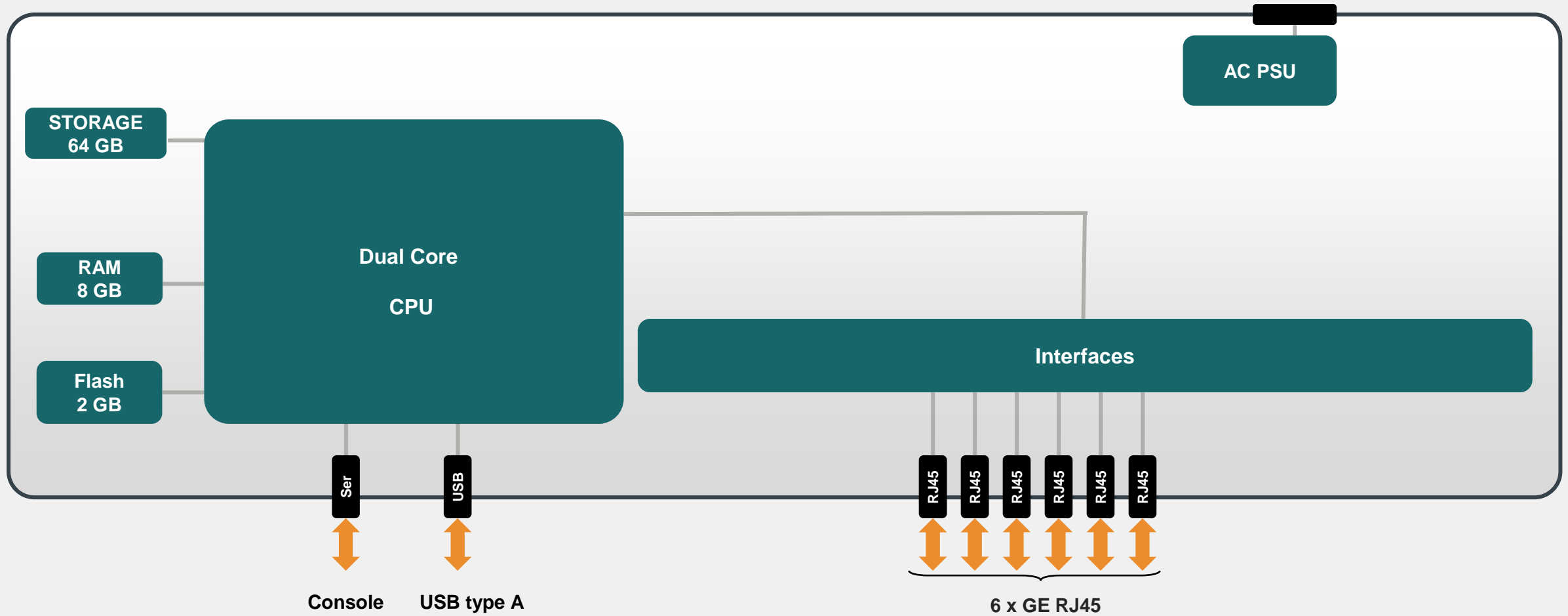
FortiADC 60F



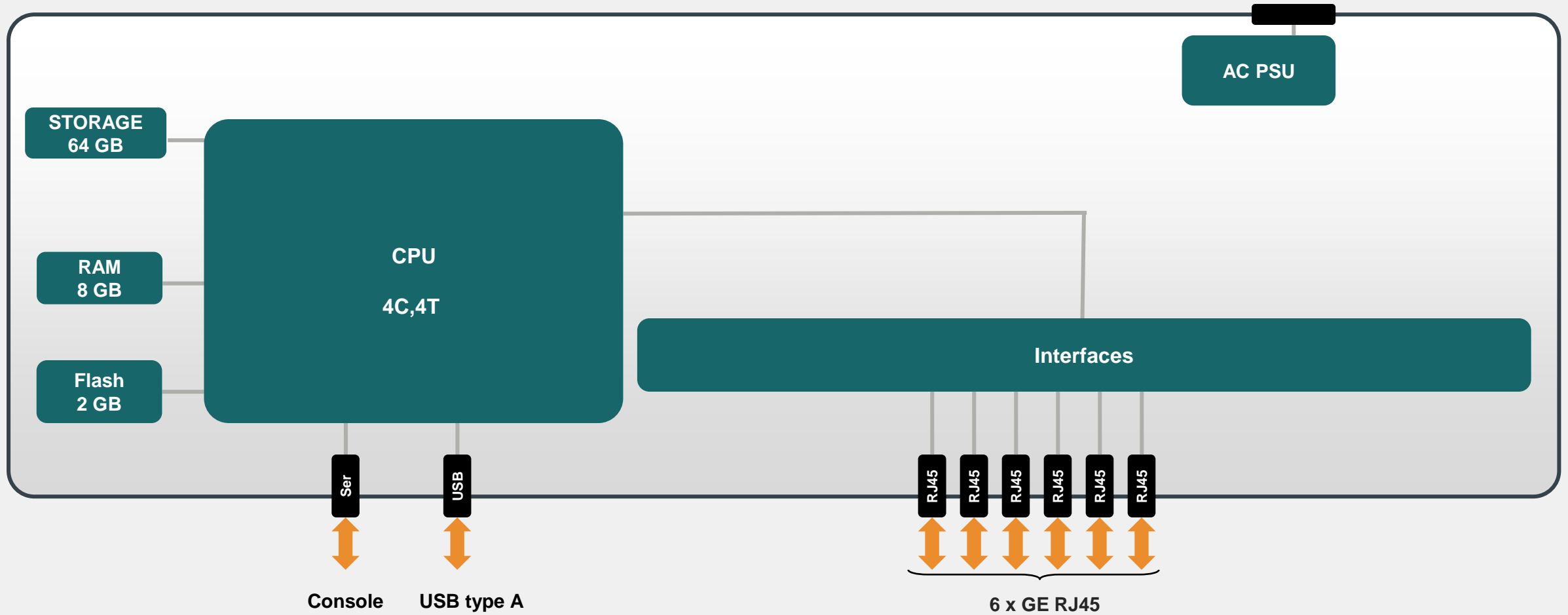
FortiADC 100F



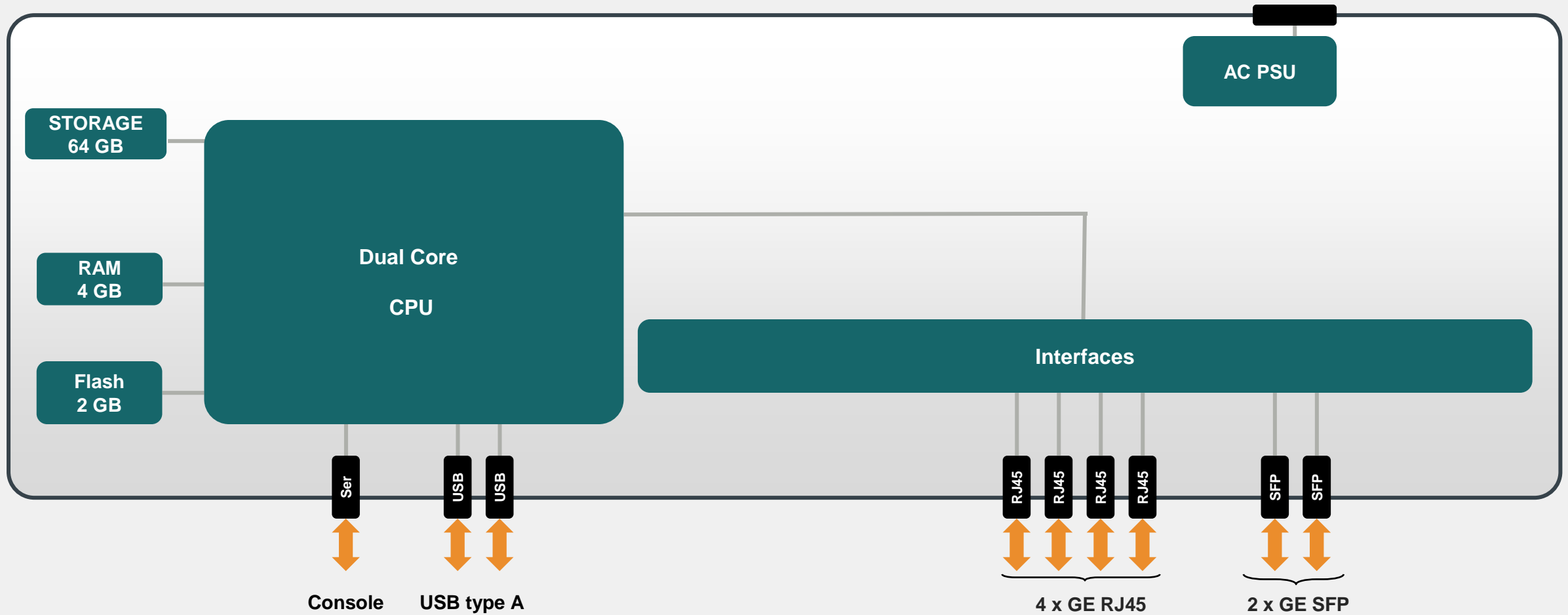
FortiADC 100F Gen2



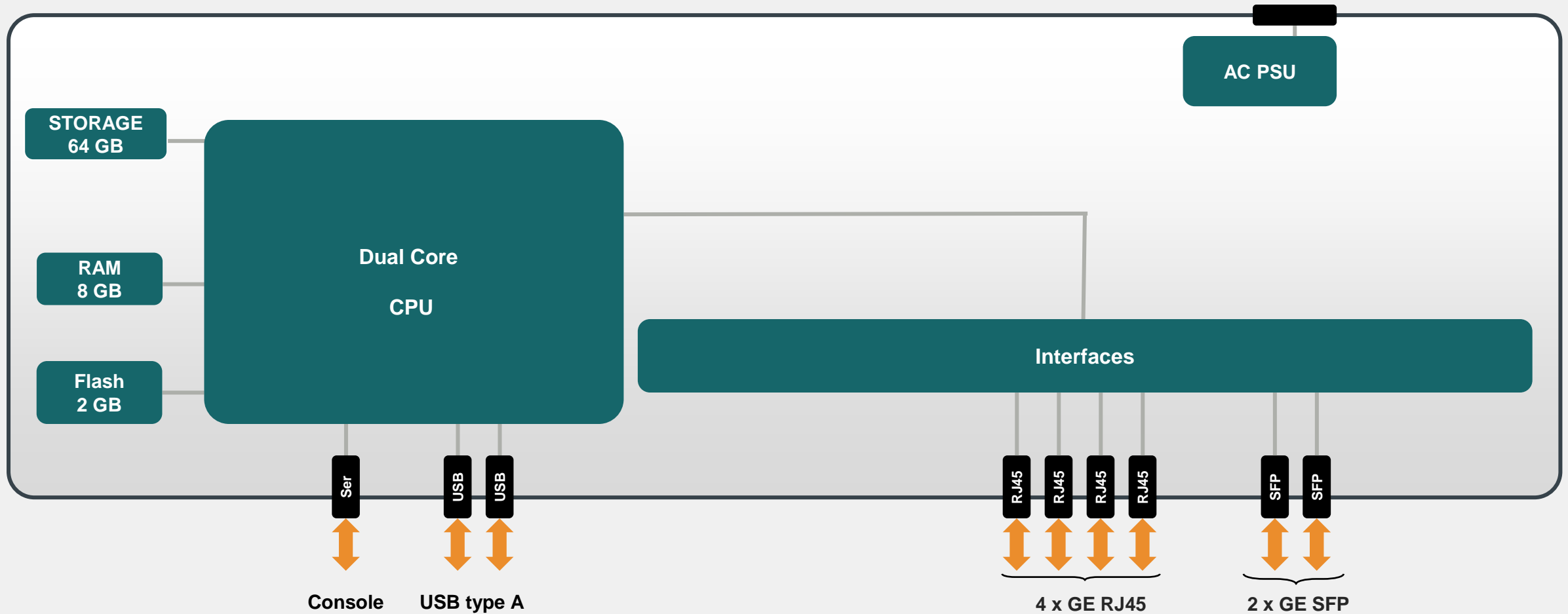
FortiADC 120F



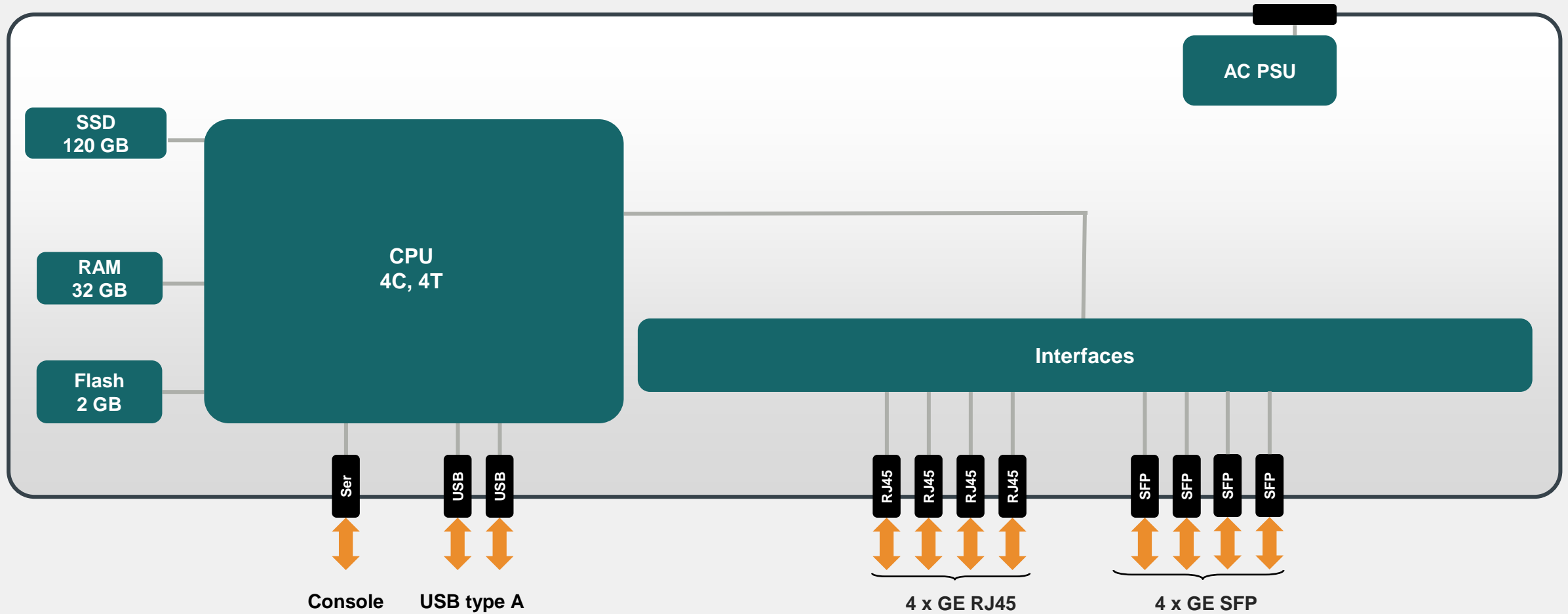
FortiADC 200F



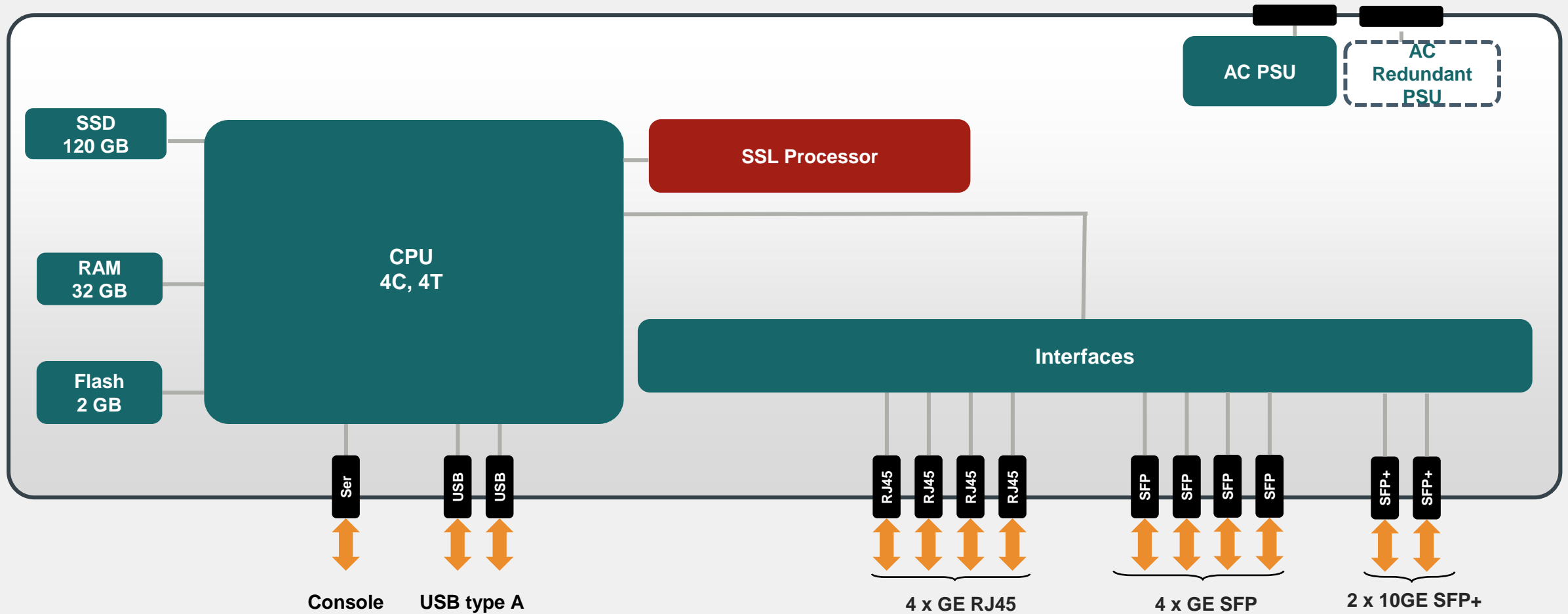
FortiADC 200F Gen2



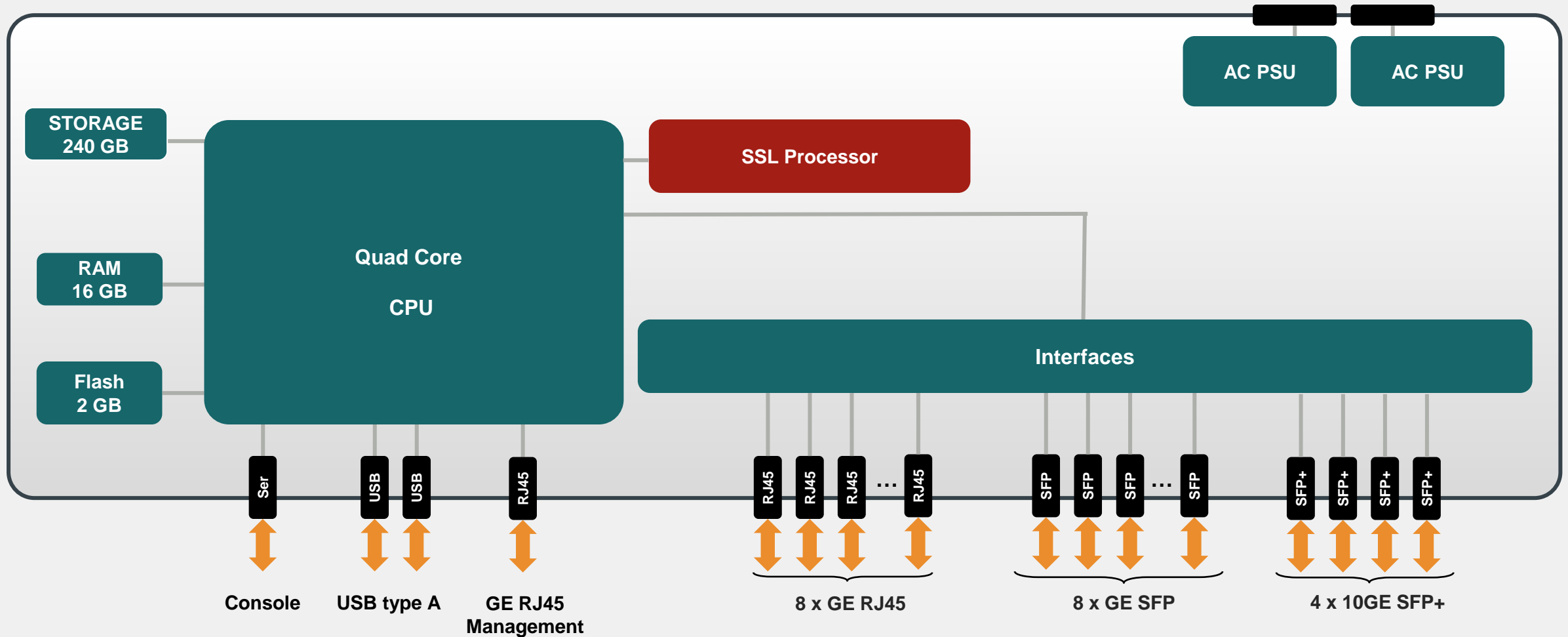
FortiADC 300F



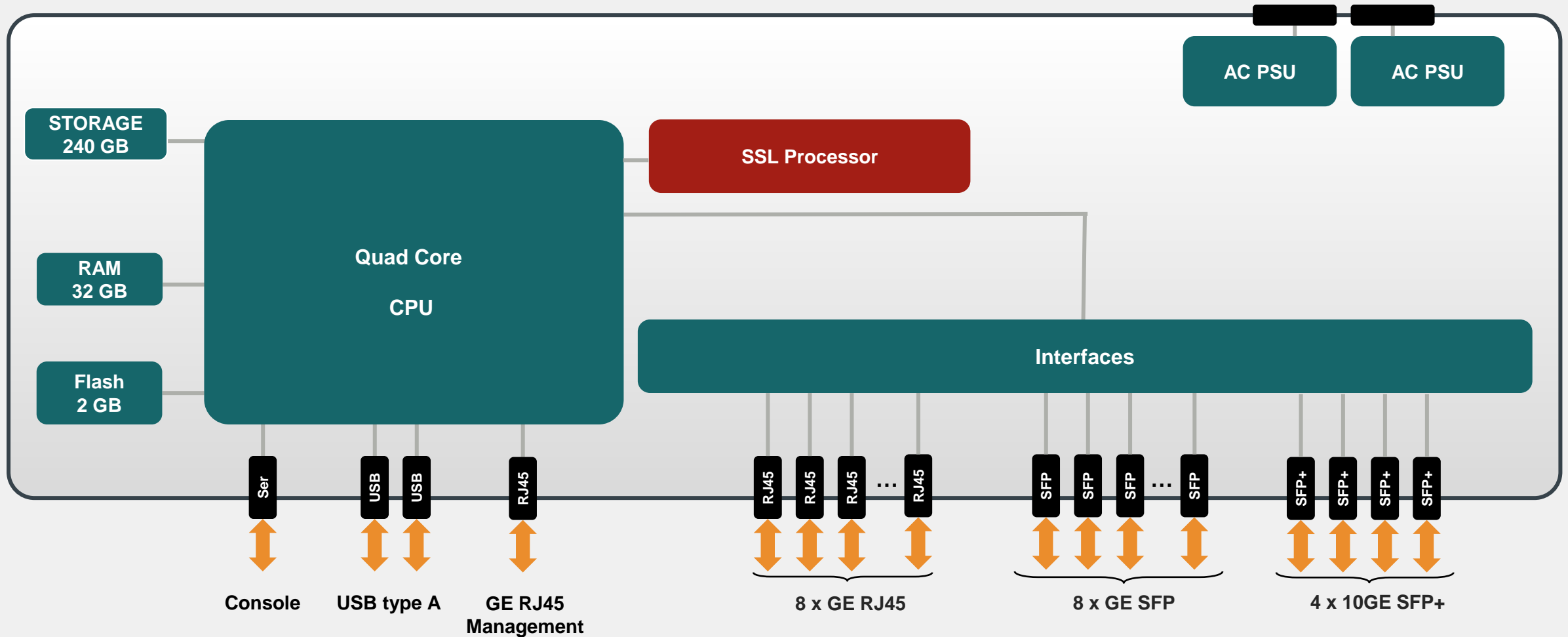
FortiADC 400F



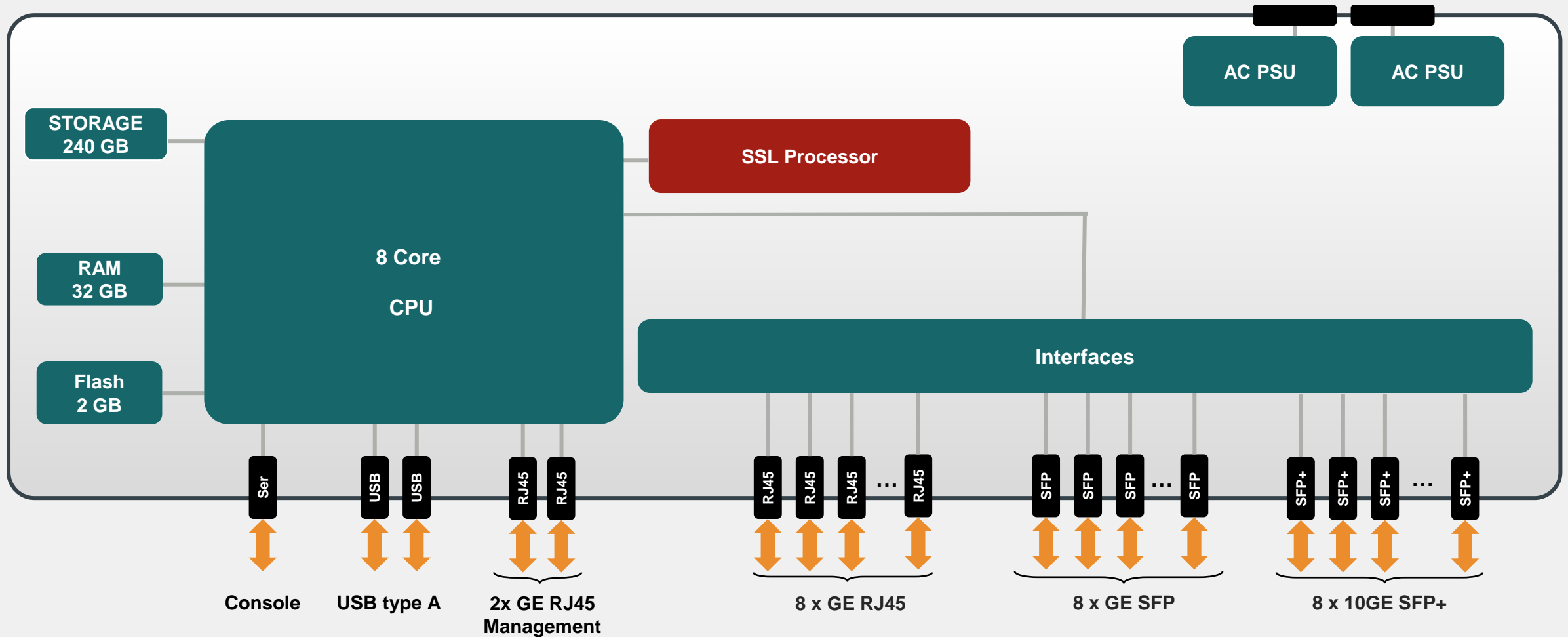
FortiADC 1000F



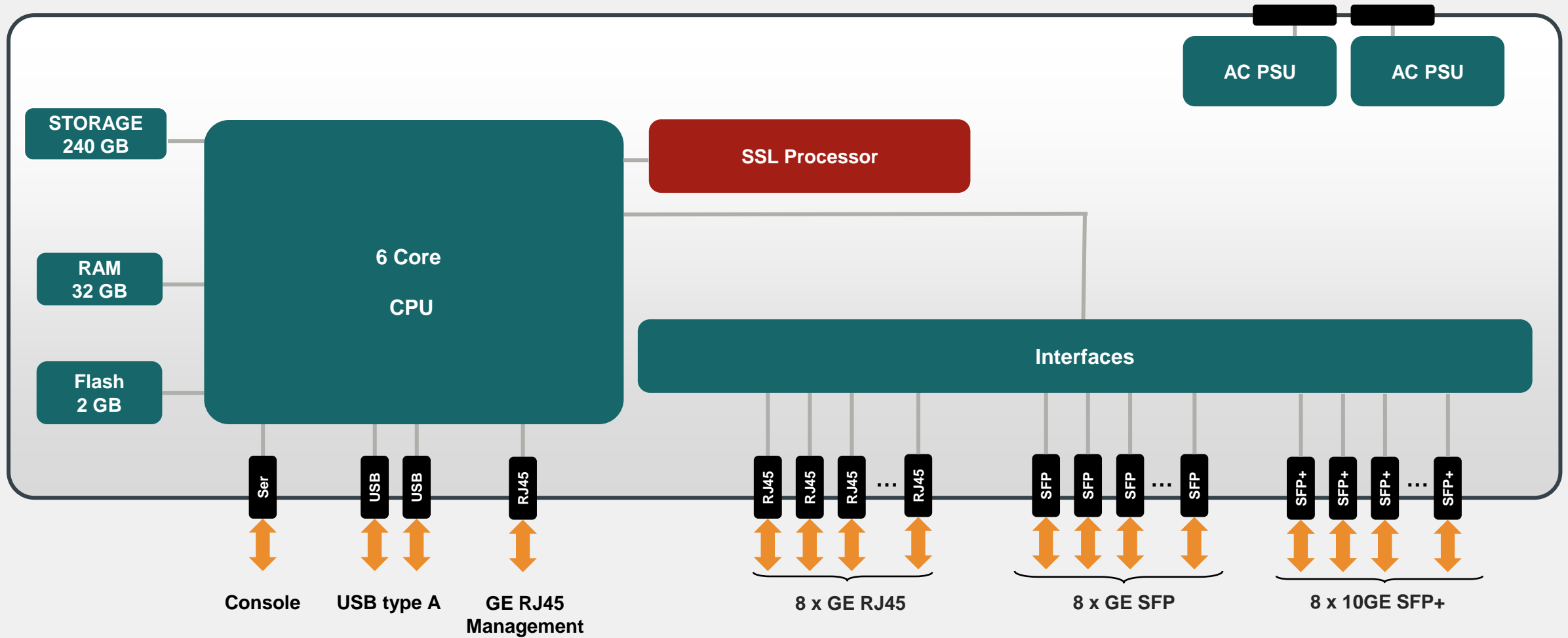
FortiADC 1000F Gen2



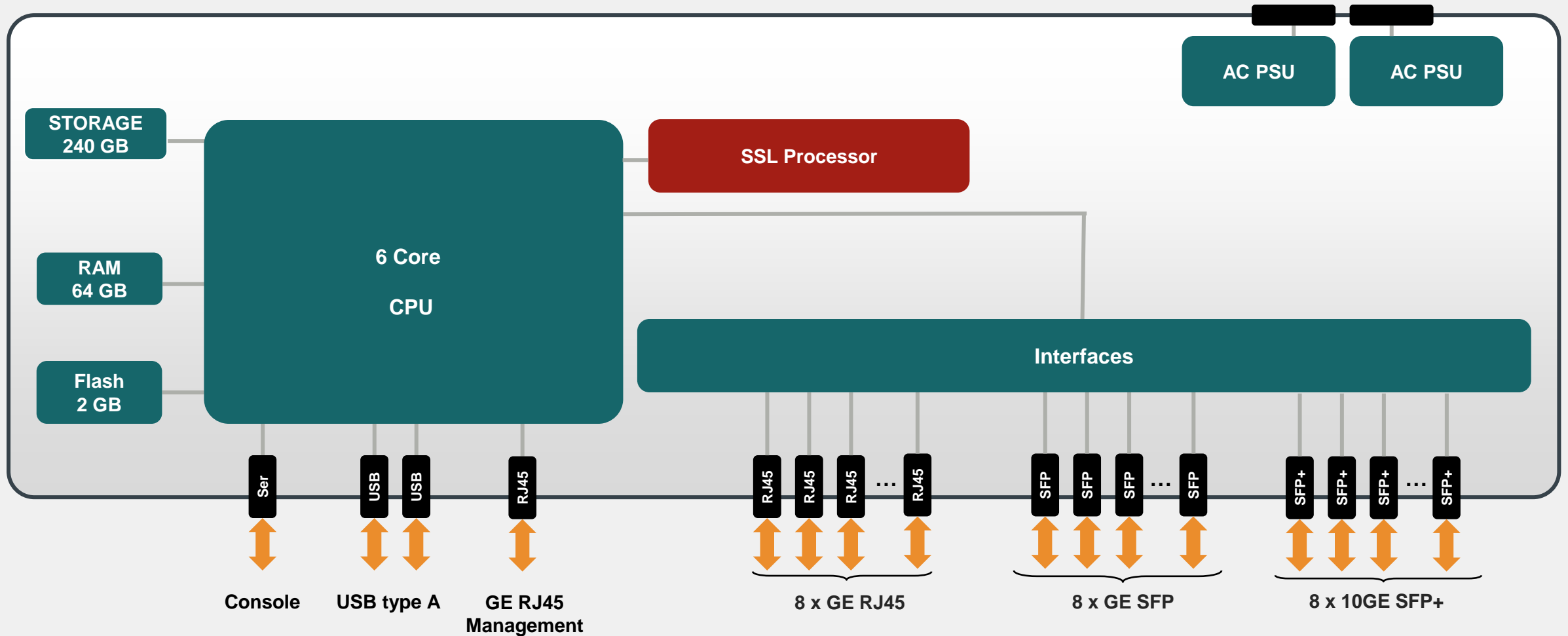
FortiADC 1200F



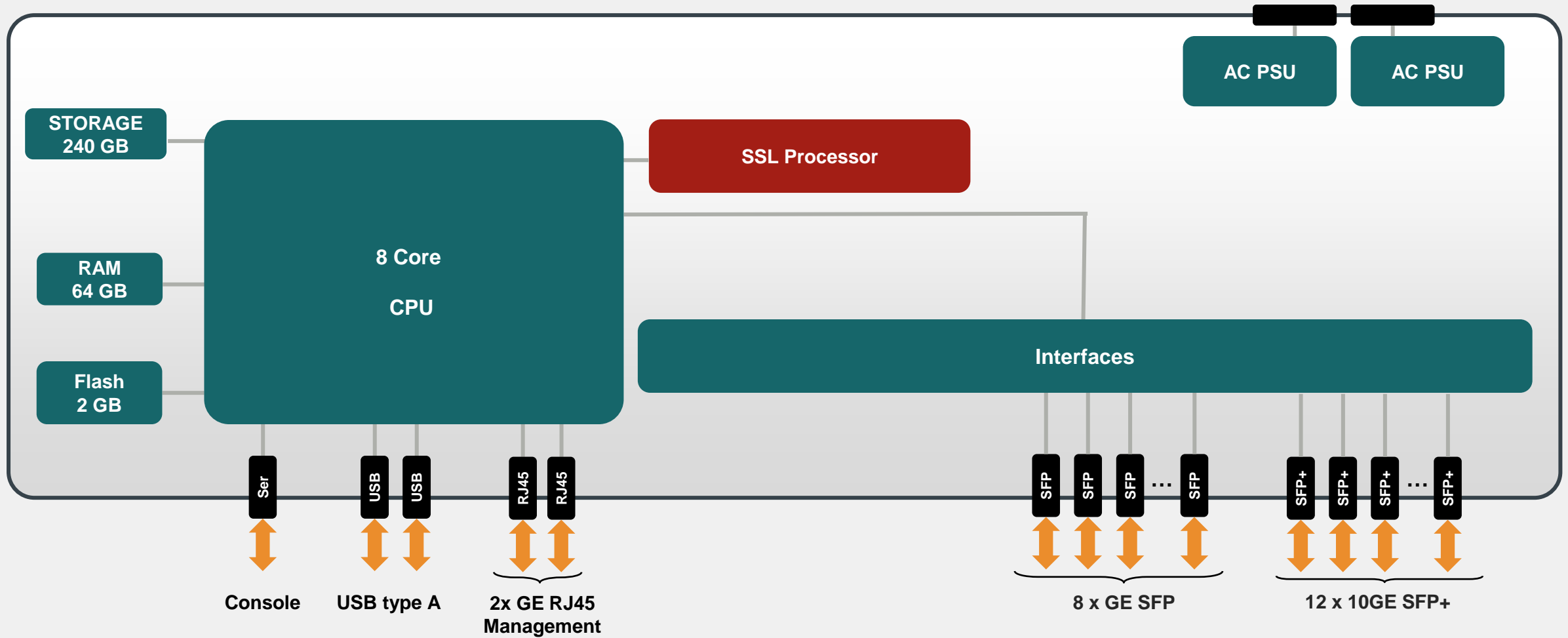
FortiADC 2000F



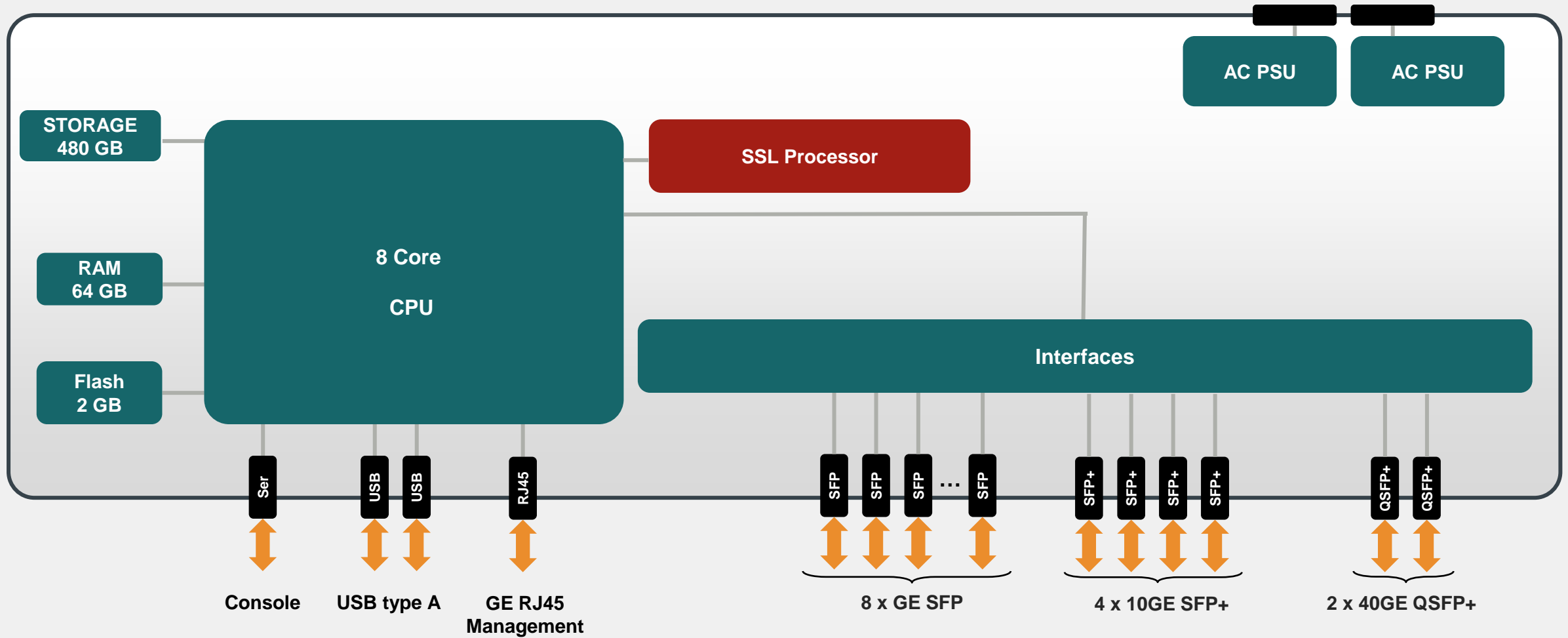
FortiADC 2000F Gen2



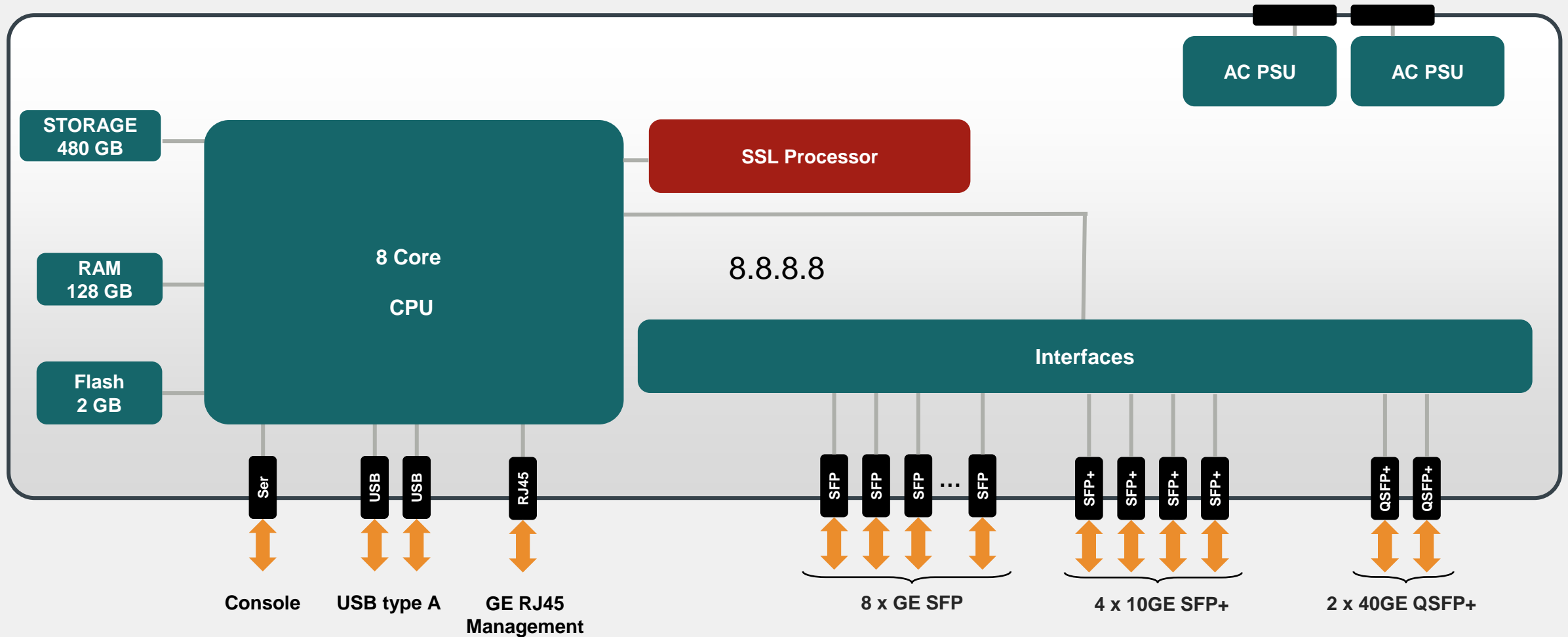
FortiADC 2200F



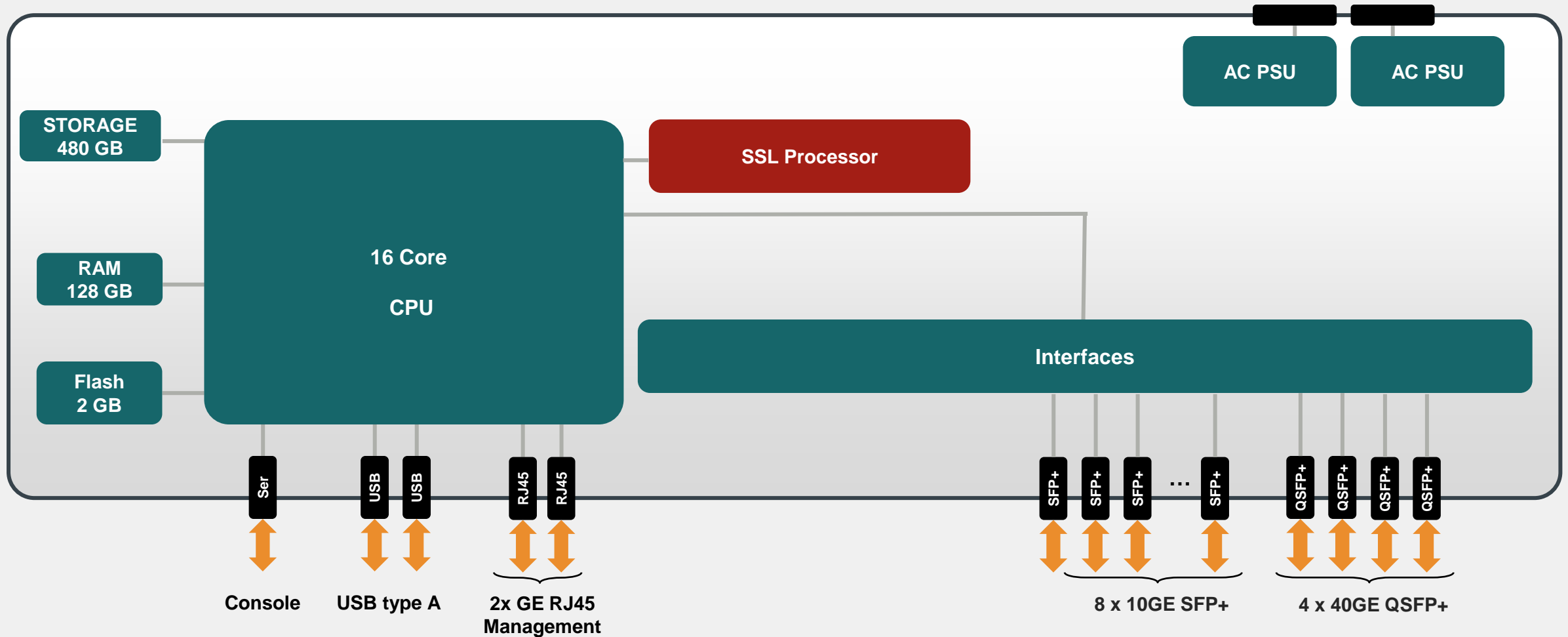
FortiADC 4000F



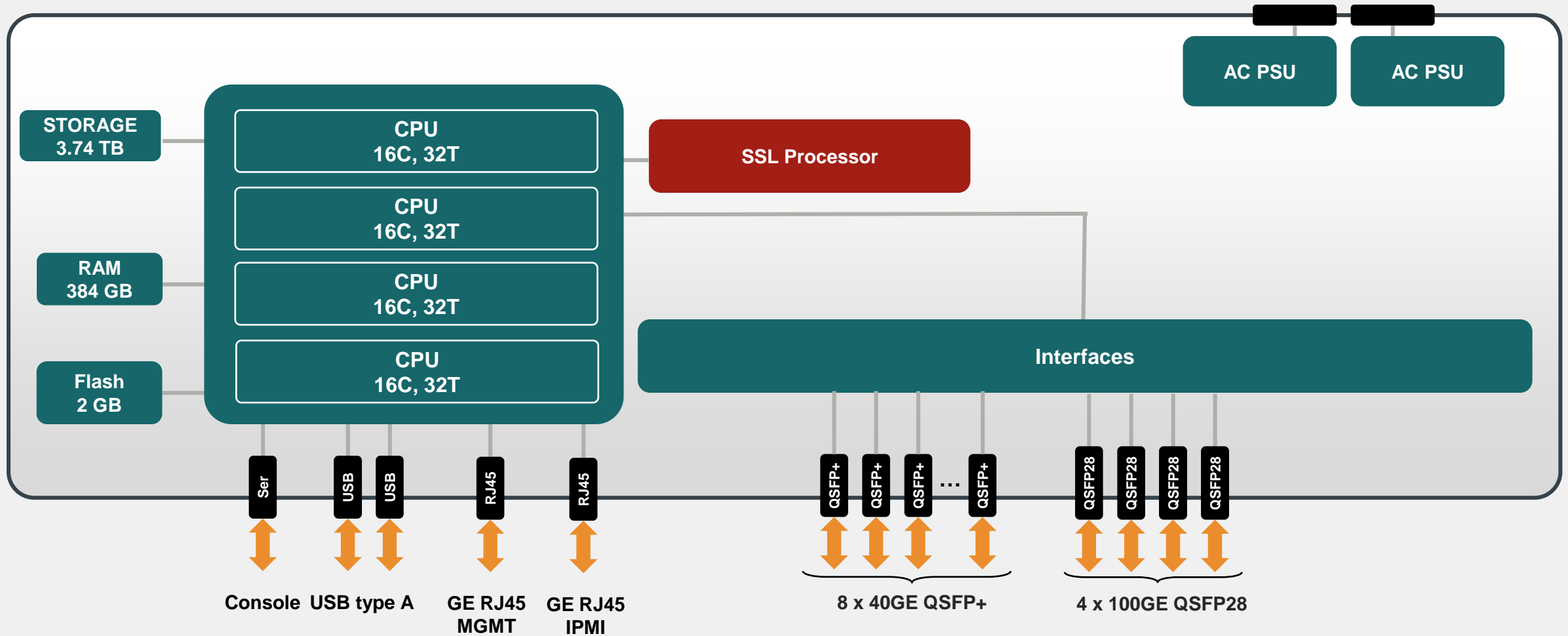
FortiADC 4000F Gen2



FortiADC 4200F



FortiADC 5000F

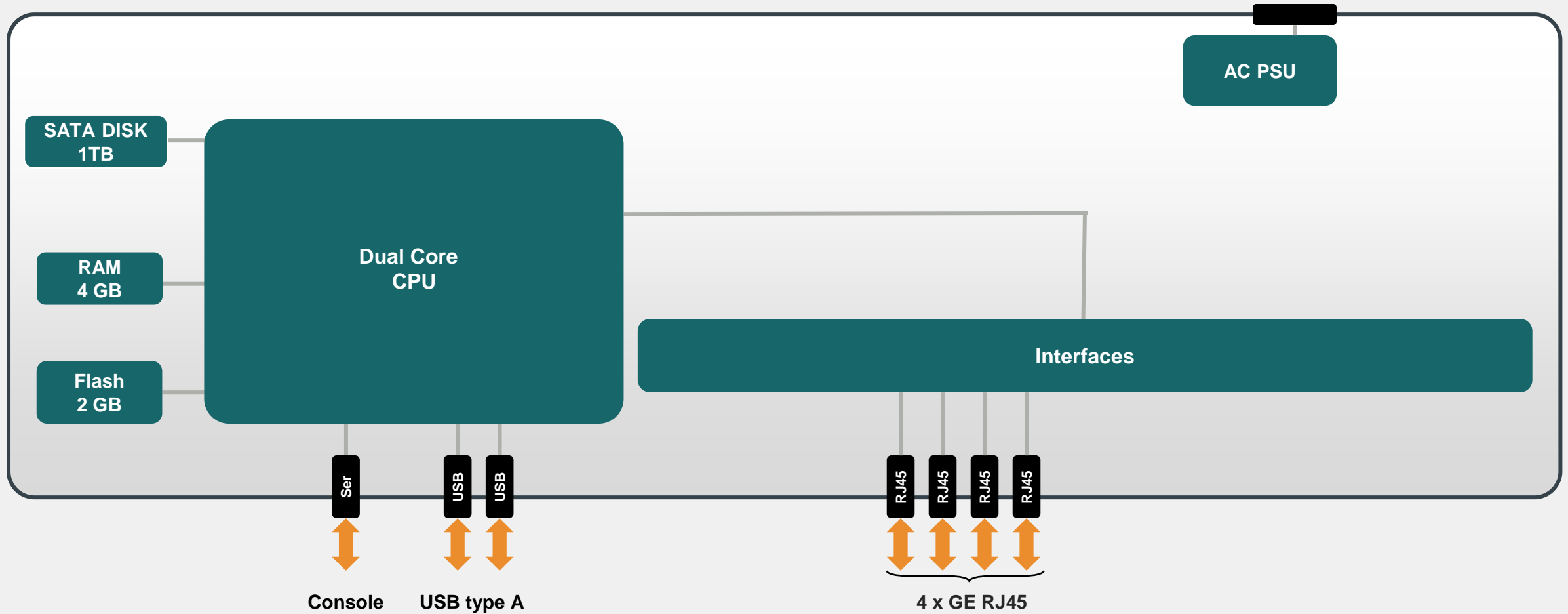




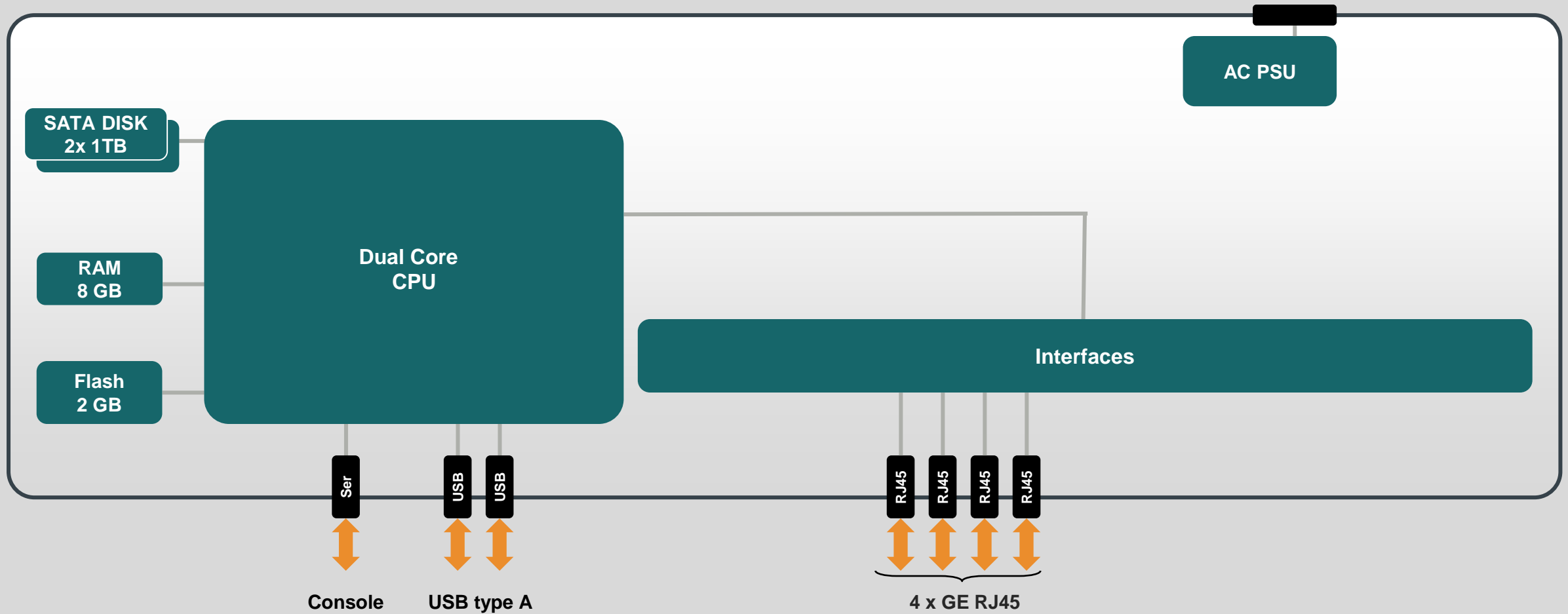
FortiAuthenticator



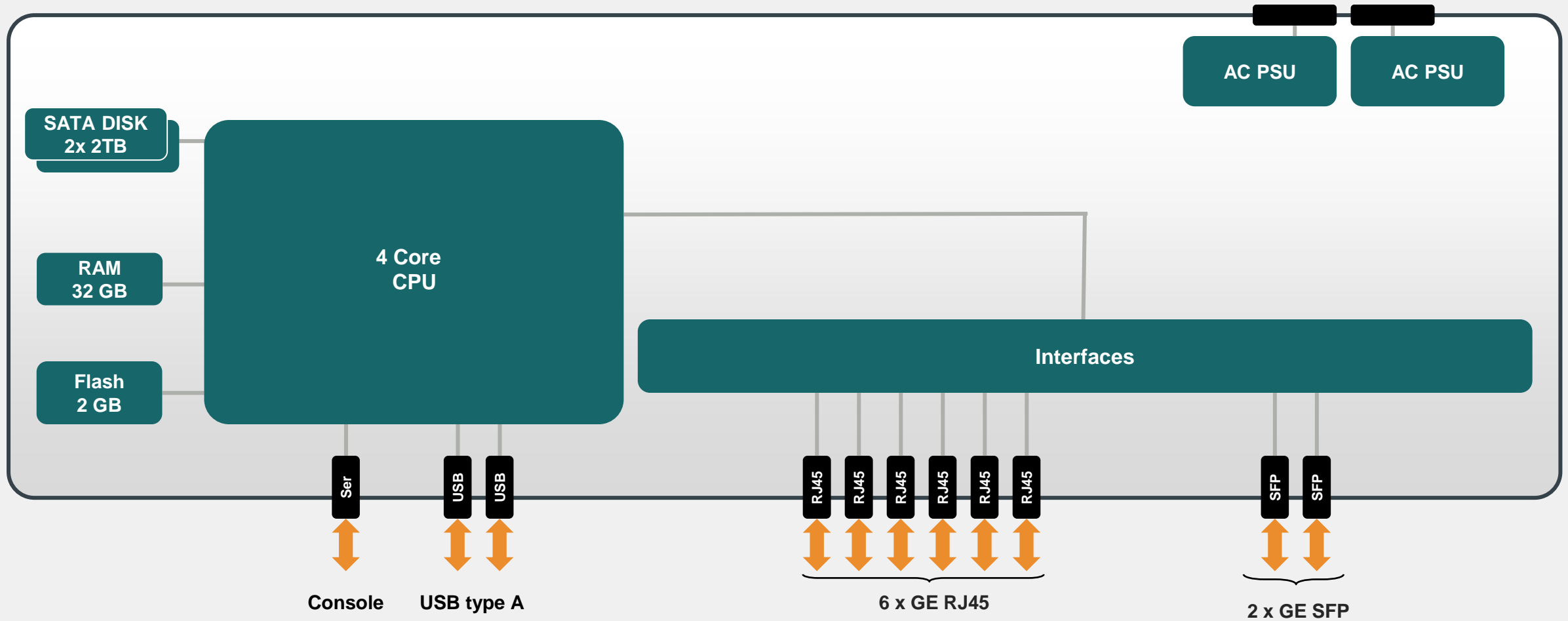
FortiAuthenticator 200E Schematic



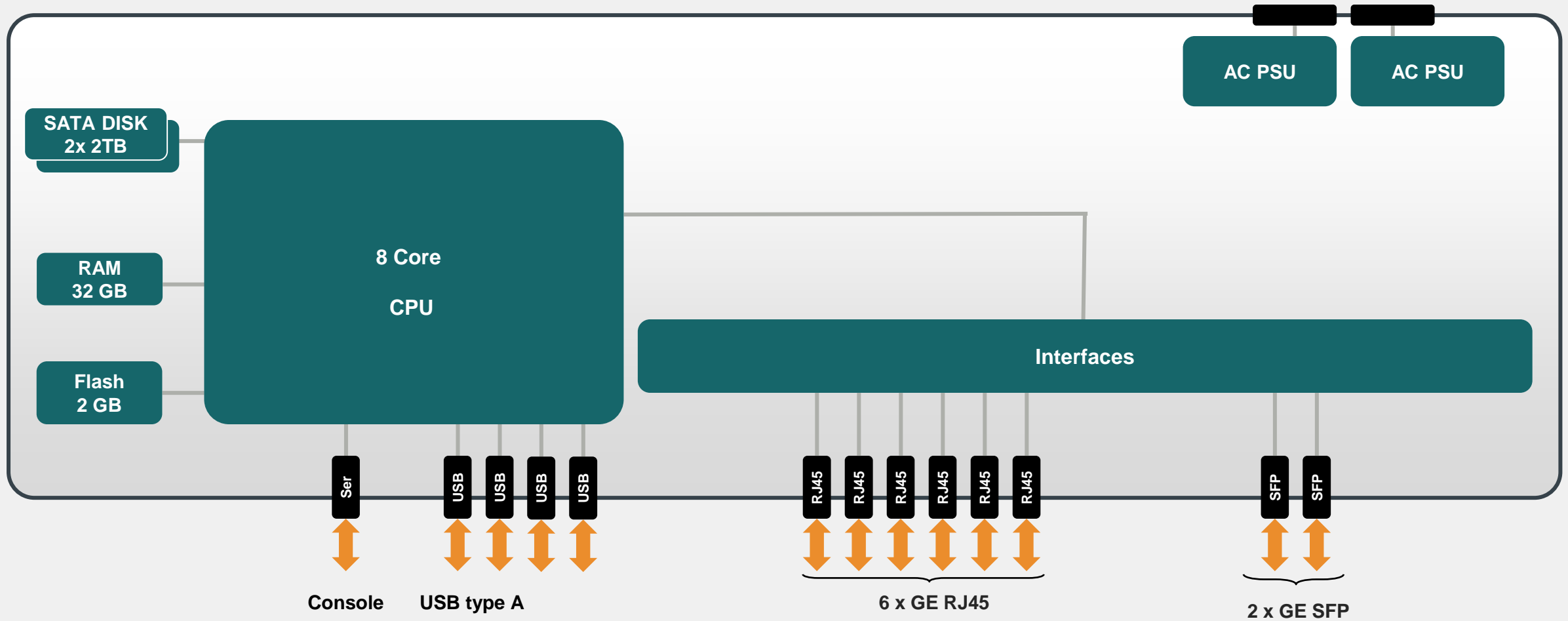
FortiAuthenticator 400E Schematic



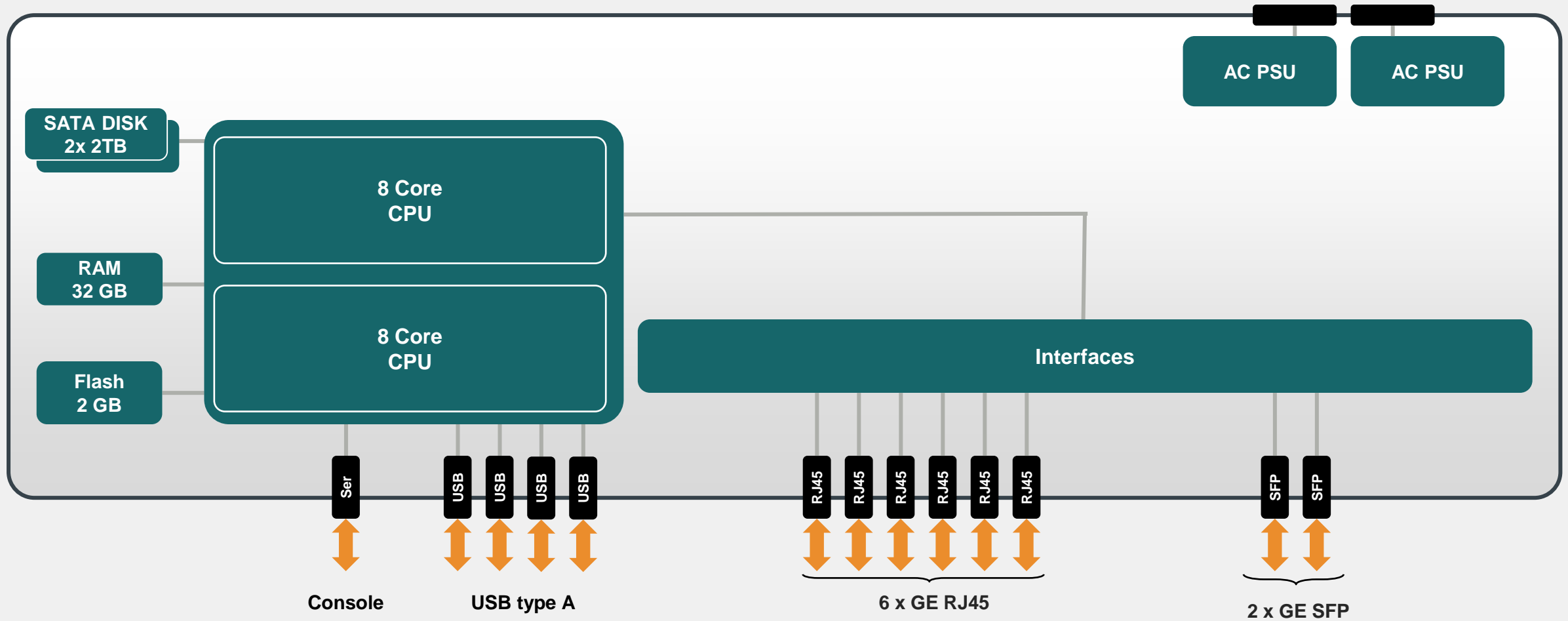
FortiAuthenticator 1000D Schematic



FortiAuthenticator 2000E Schematic



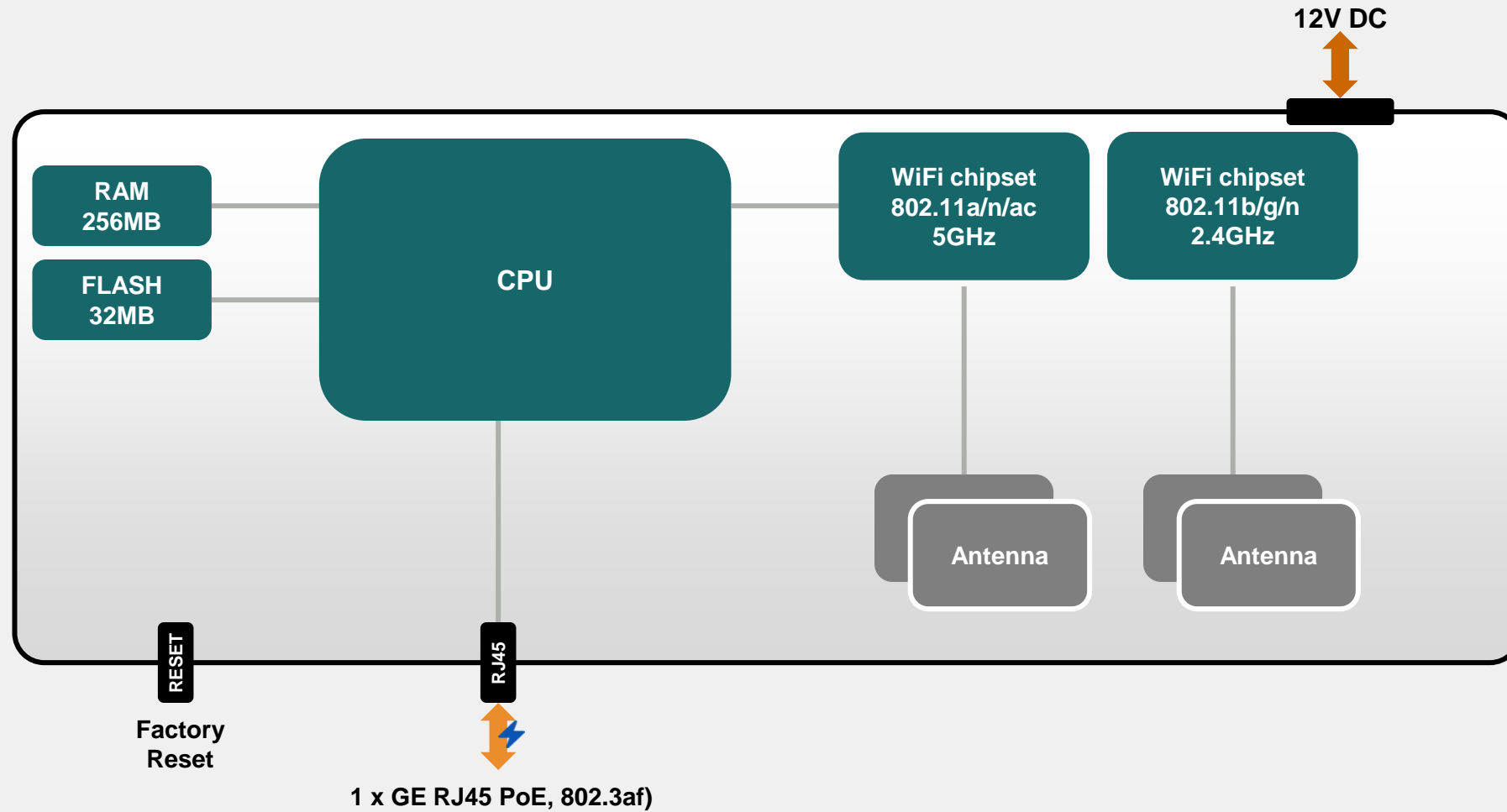
FortiAuthenticator 3000E Schematic



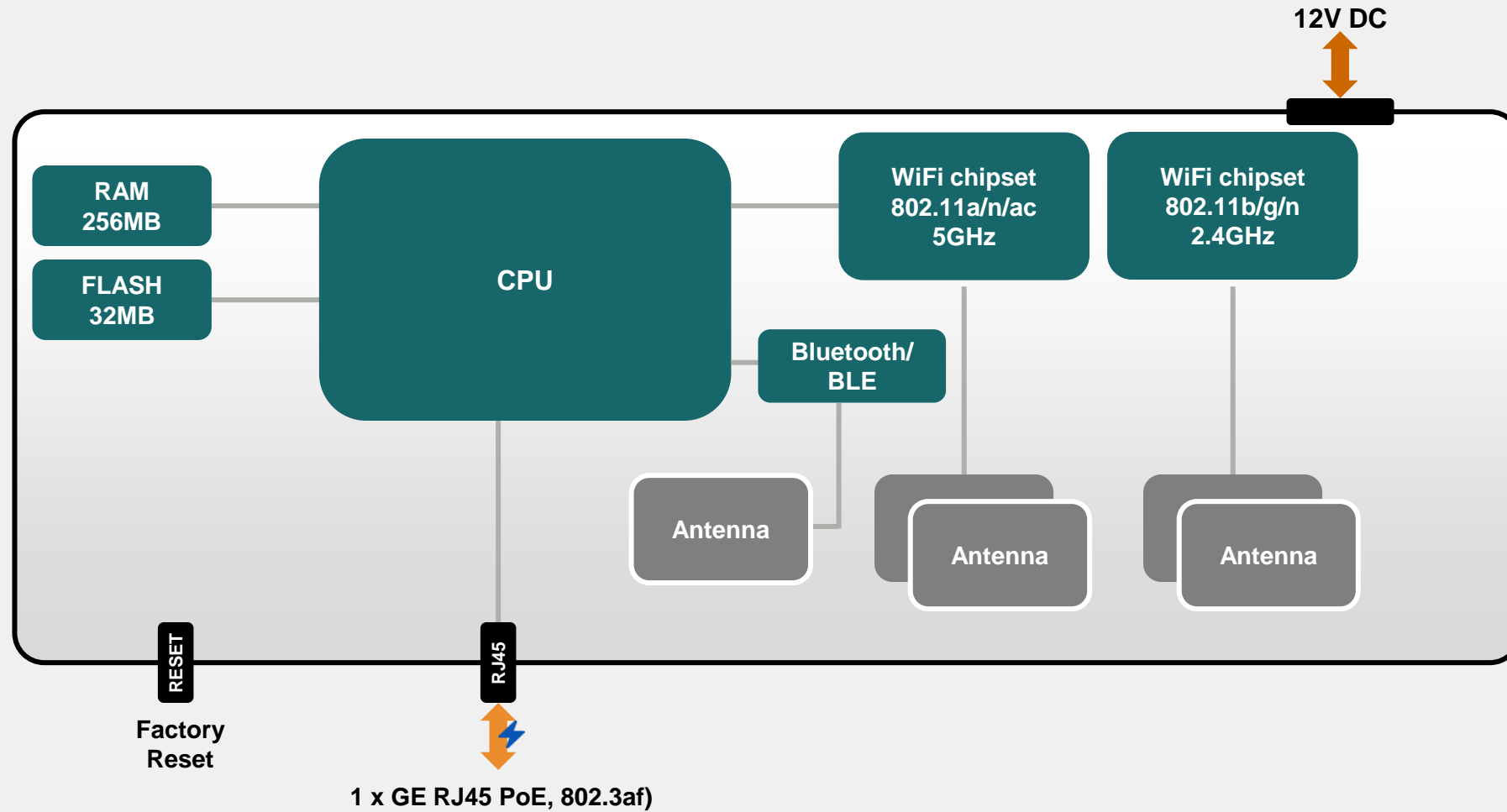
FortiAP



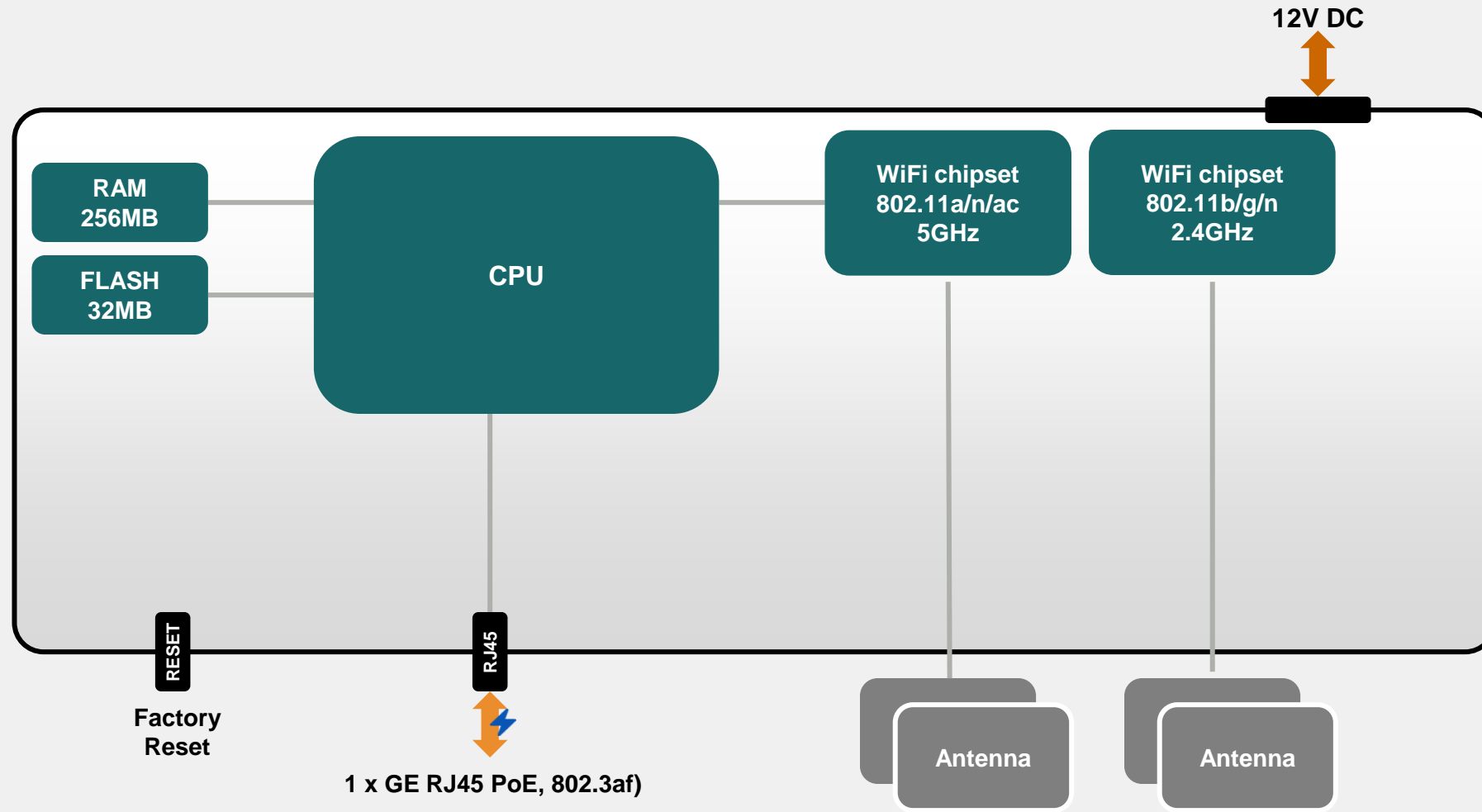
FortiAP 221E Schematic



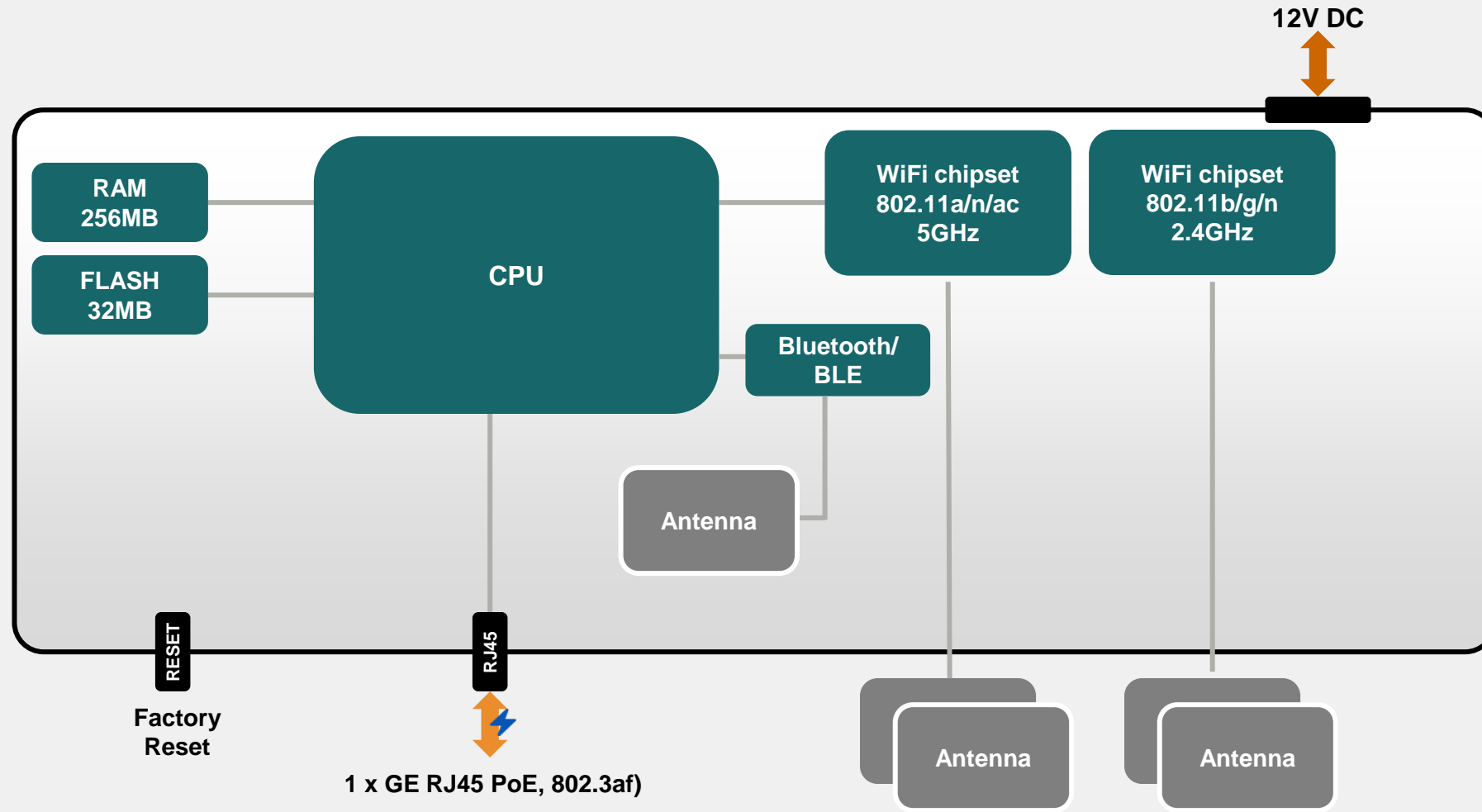
FortiAP 221E-Gen2 Schematic



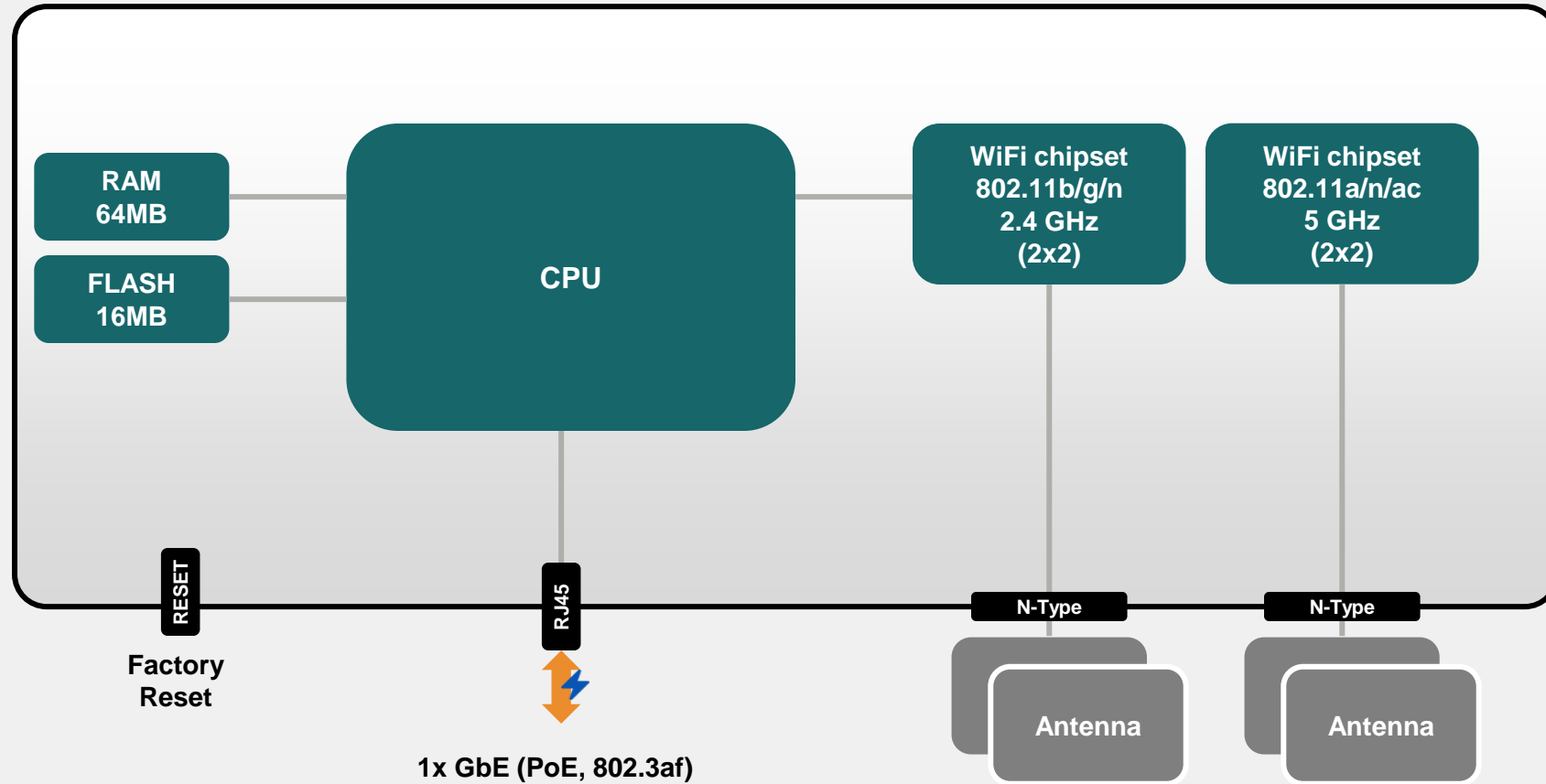
FortiAP 223E Schematic



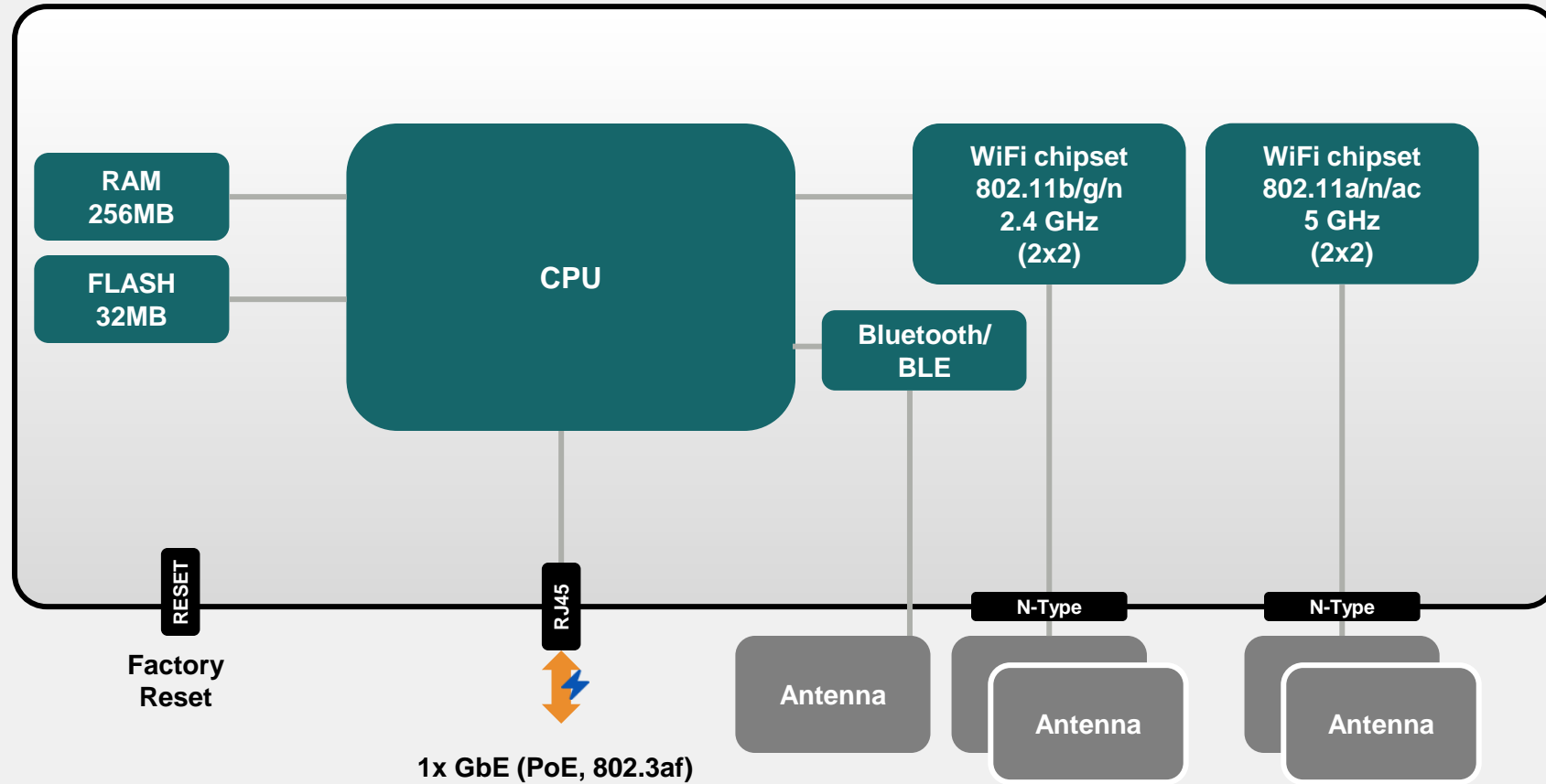
FortiAP 223E-Gen2 Schematic



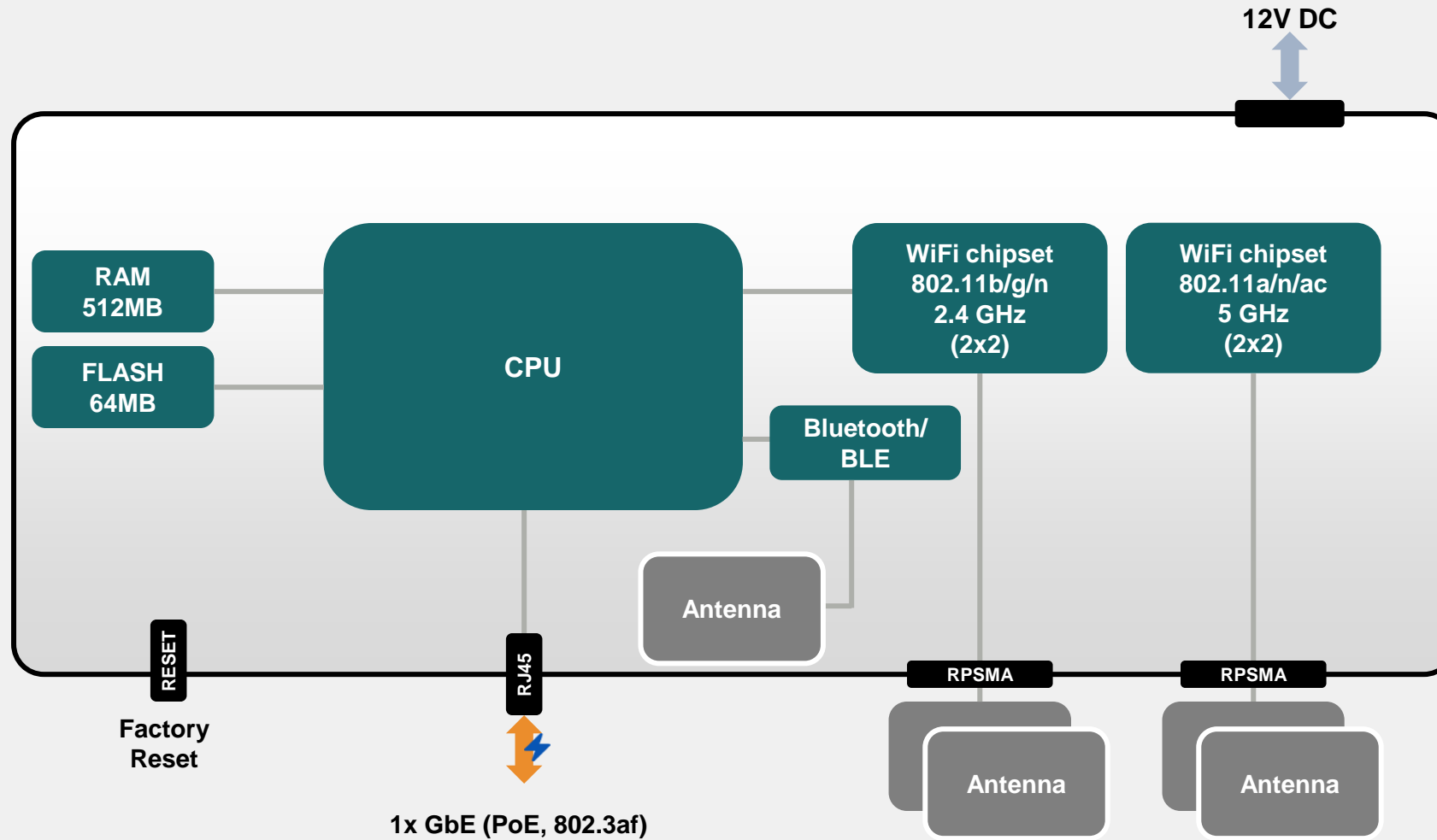
FortiAP 222C Schematic



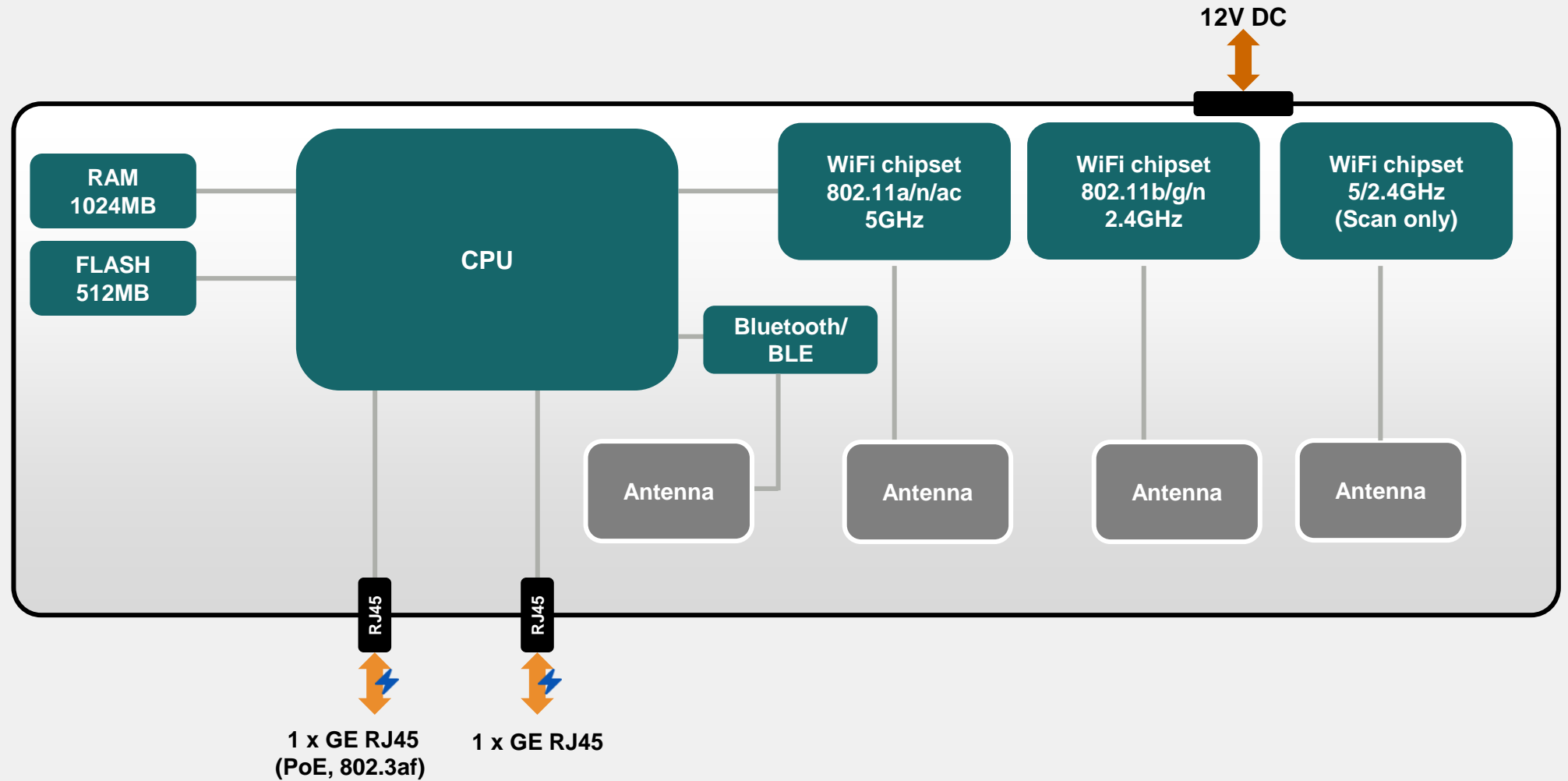
FortiAP 222E Schematic



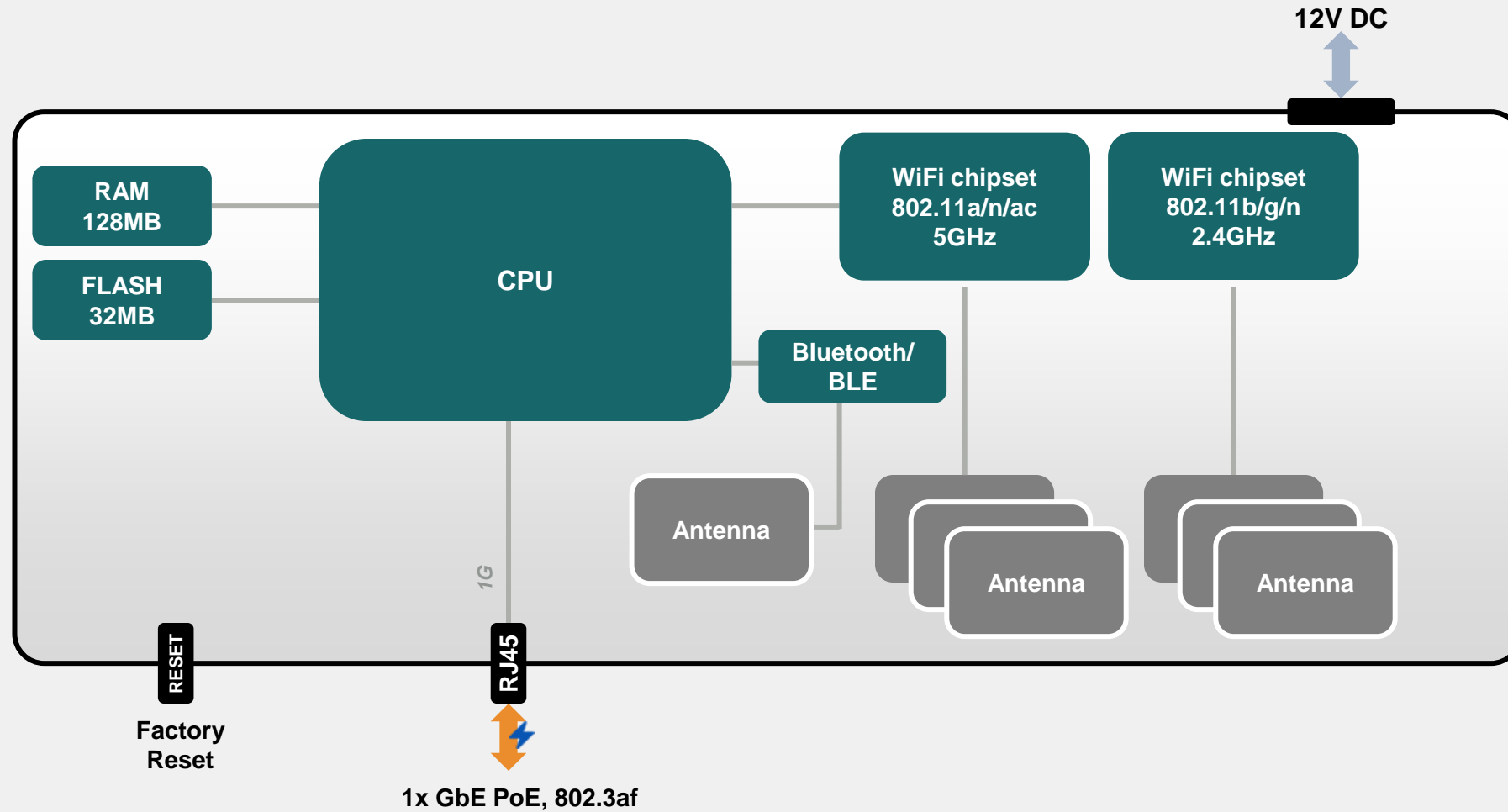
FortiAP 224E Schematic



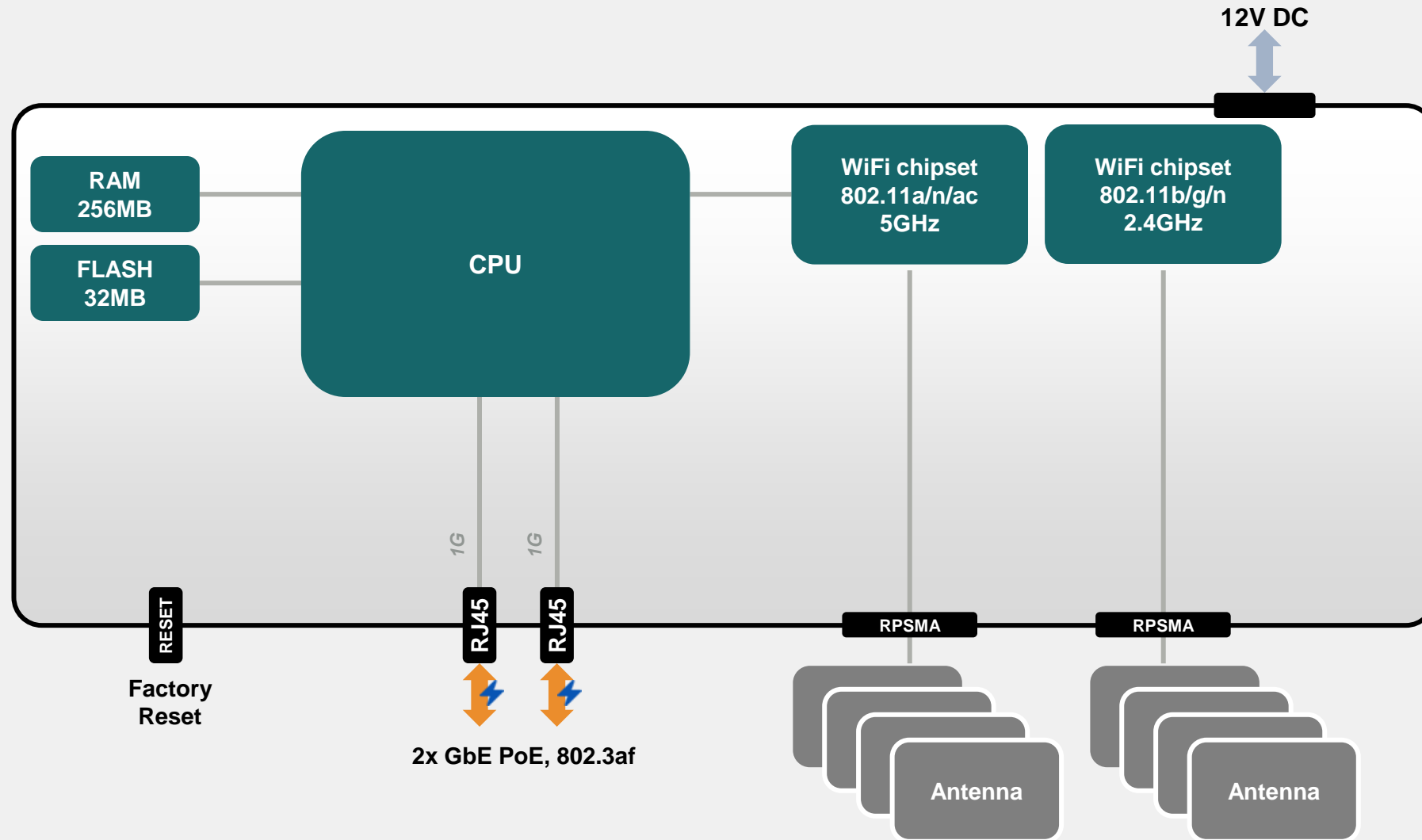
FortiAP 231F Schematic



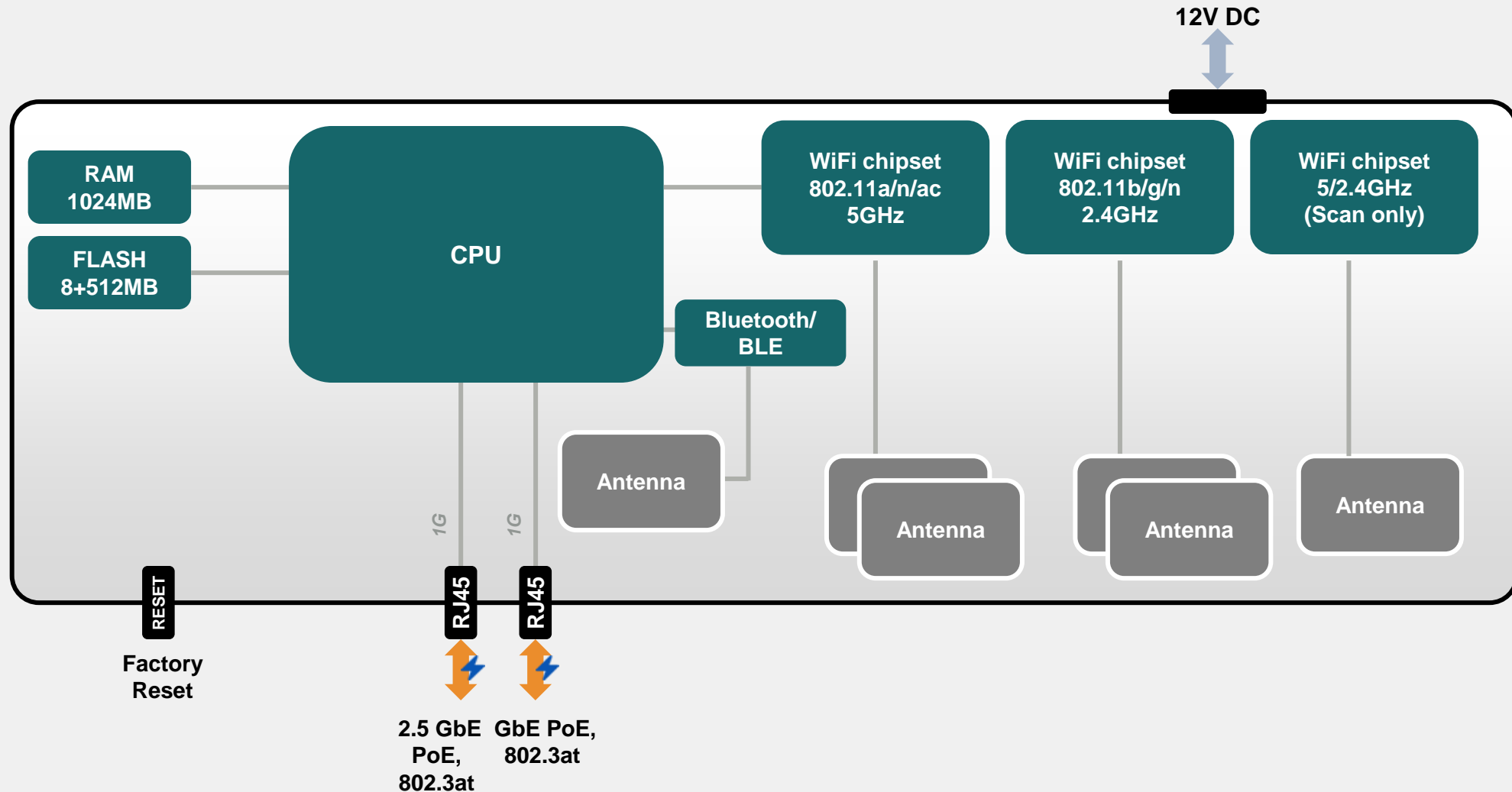
FortiAP 321E Schematic



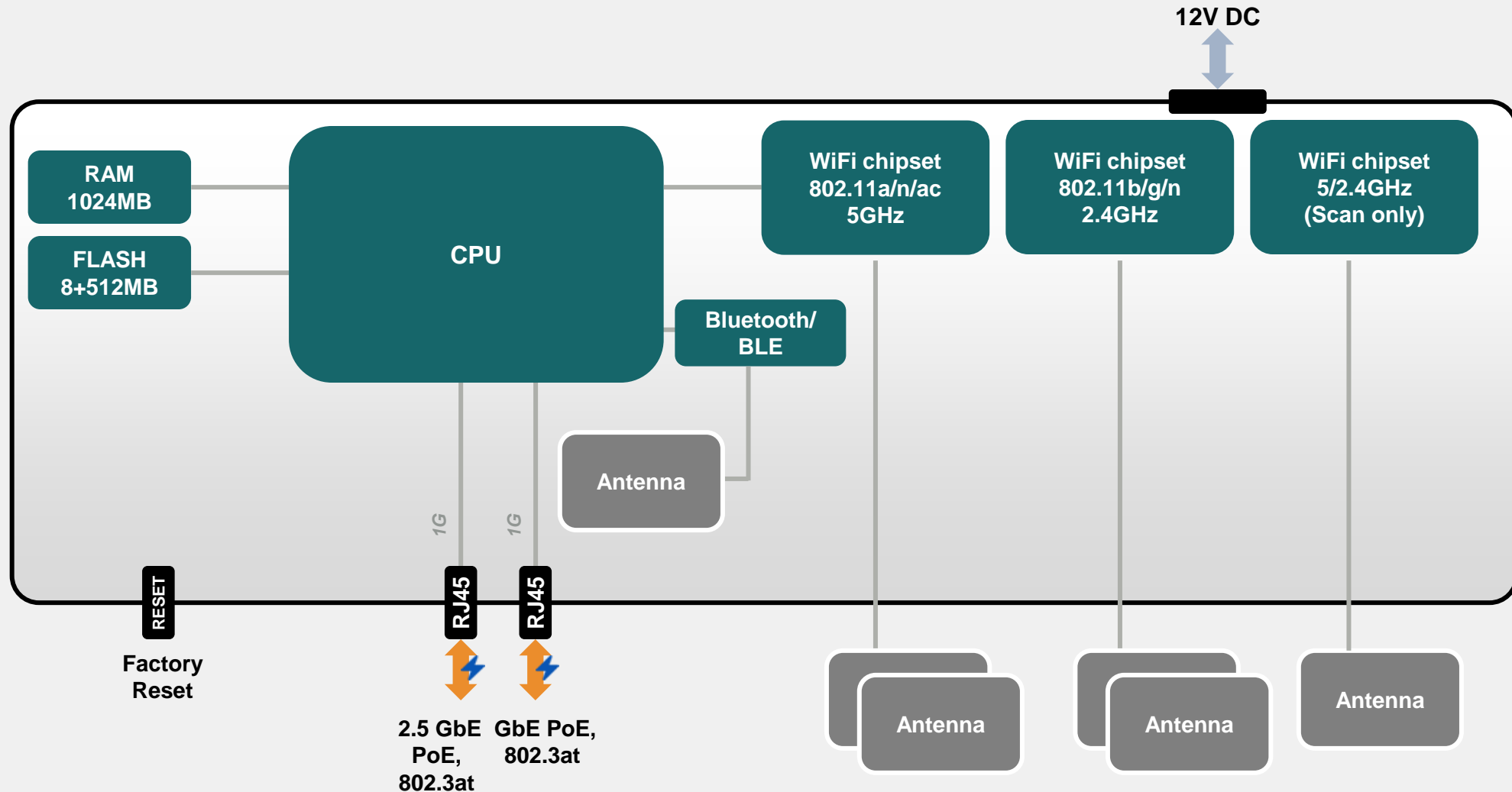
FortiAP 423E Schematic



FortiAP 431F Schematic



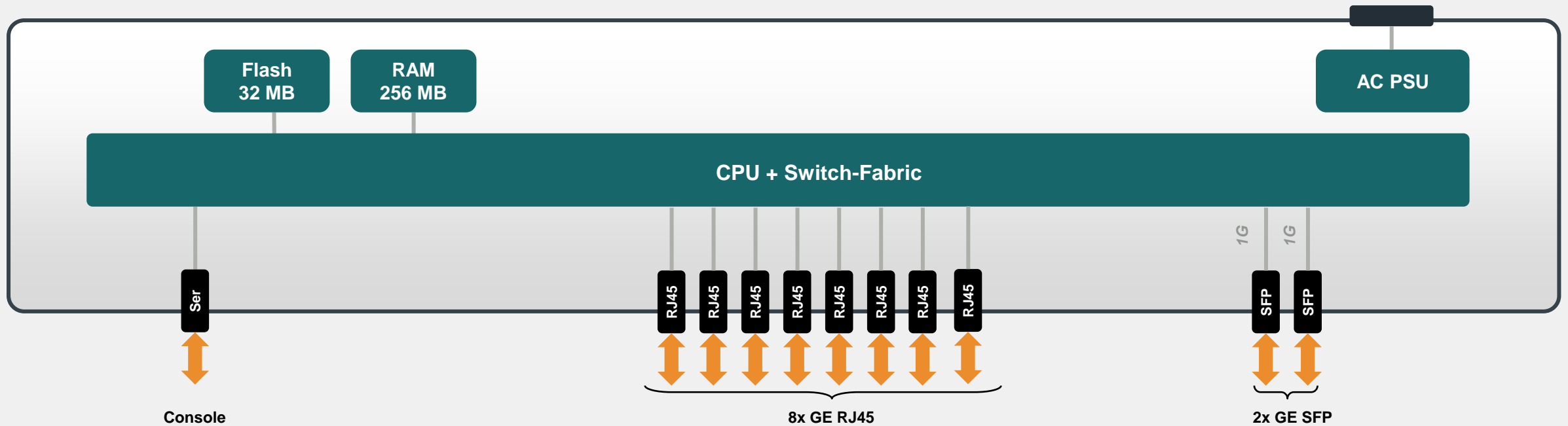
FortiAP 433F Schematic



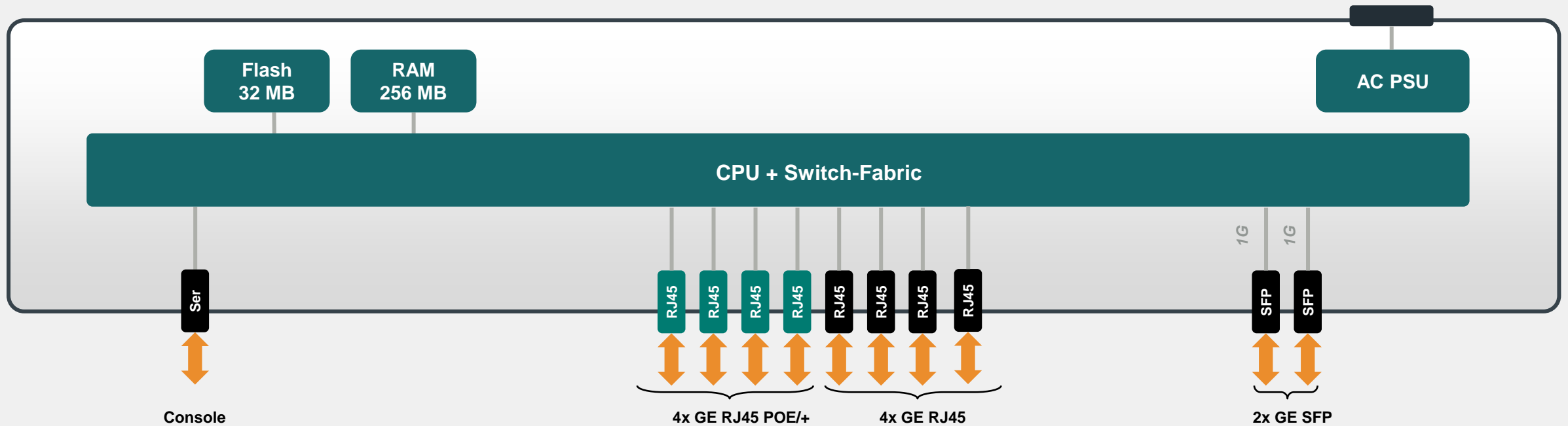
FortiSwitch



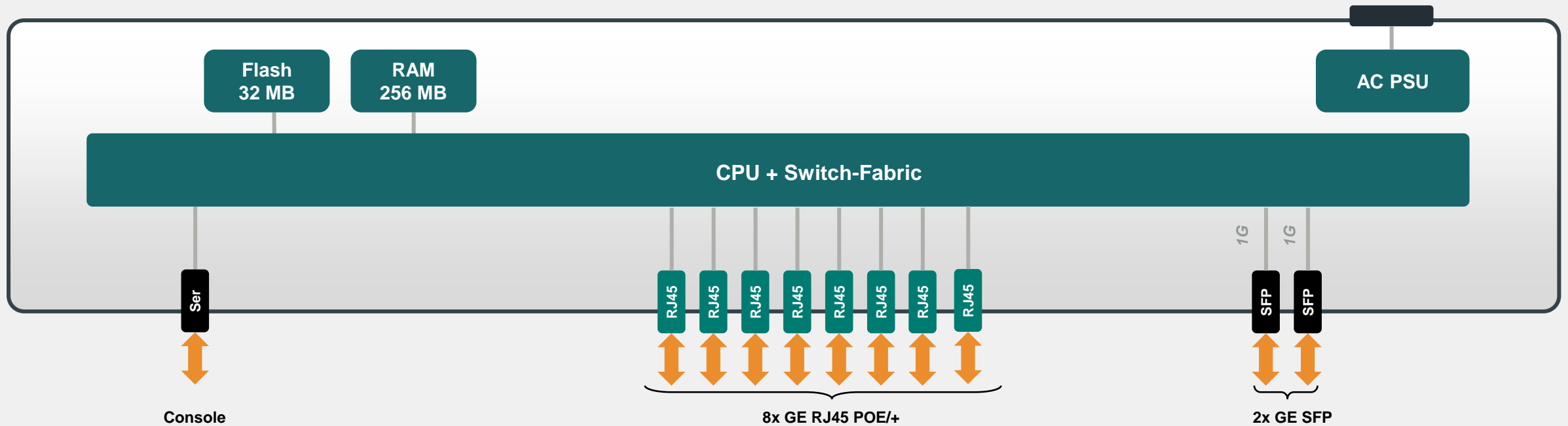
FortiSwitch 108E Schematic



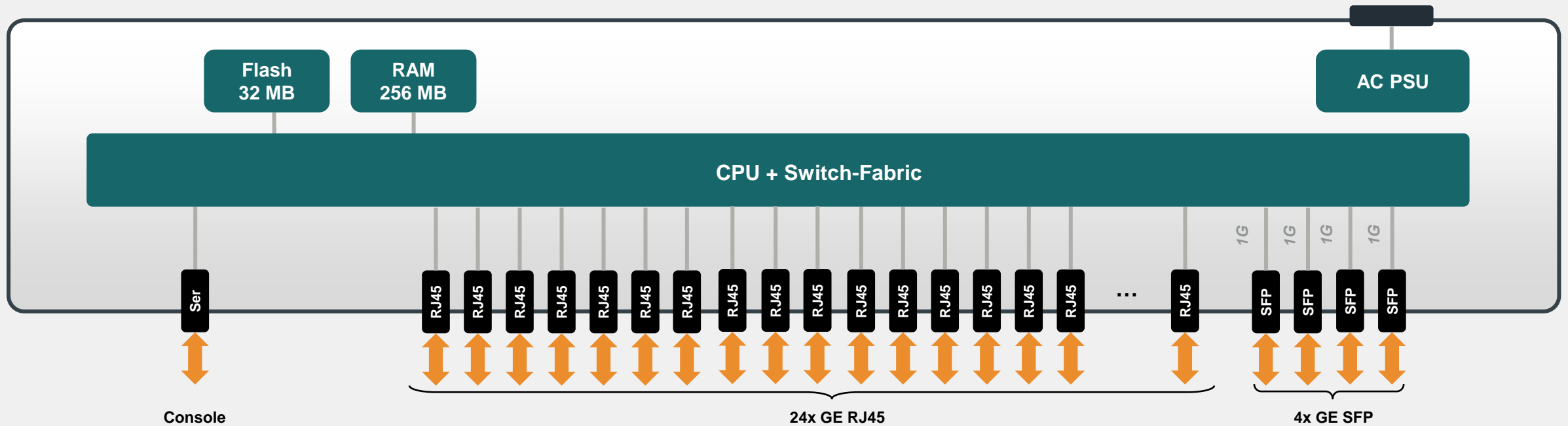
FortiSwitch 108E-POE Schematic



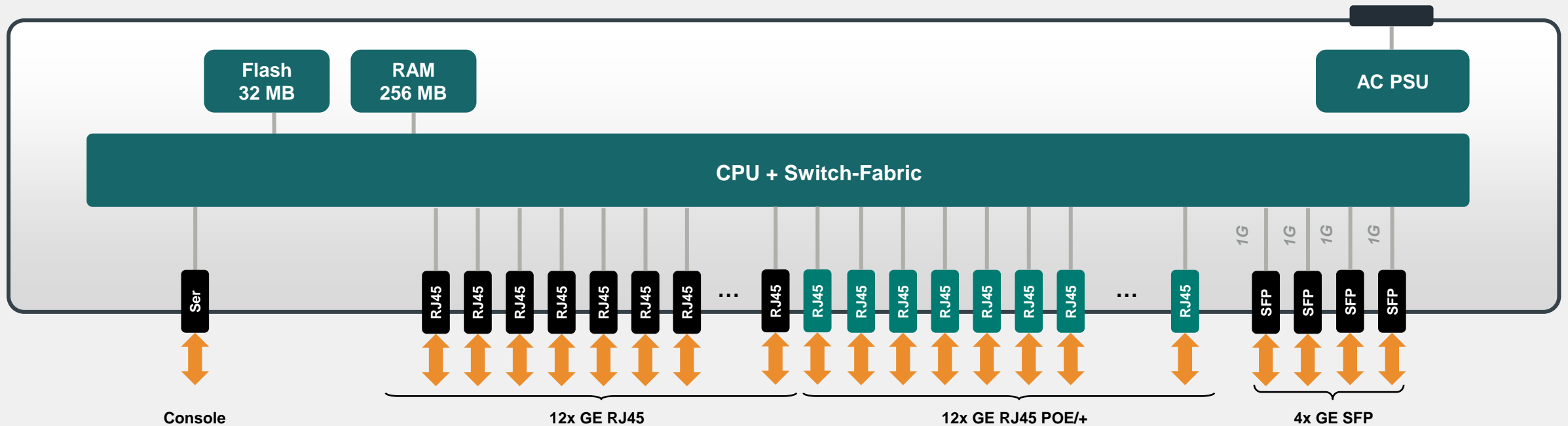
FortiSwitch 108E-FPOE Schematic



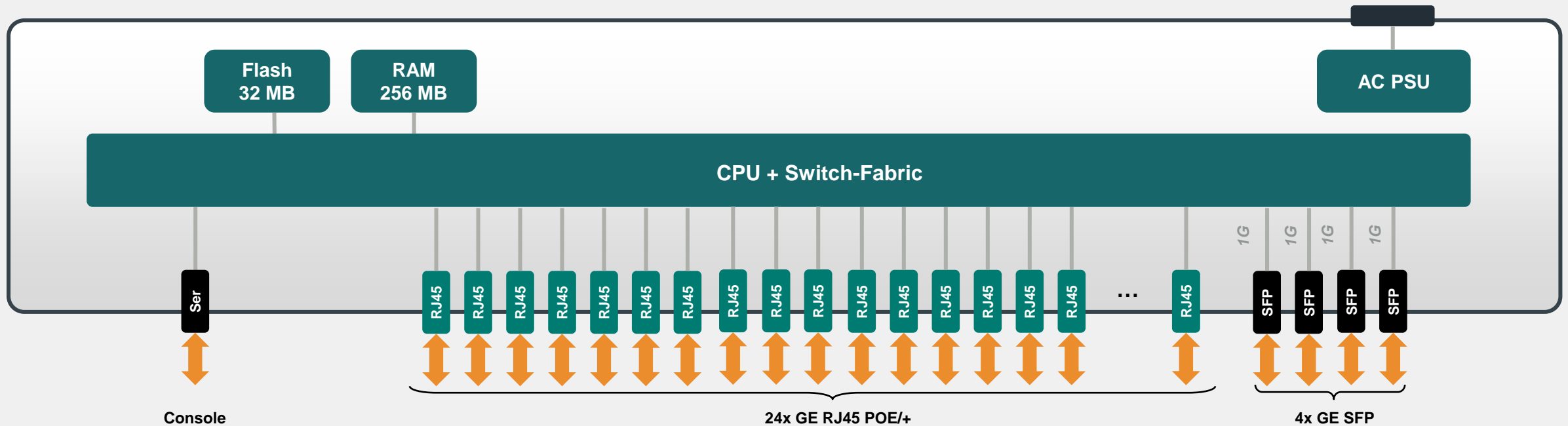
FortiSwitch 124E Schematic



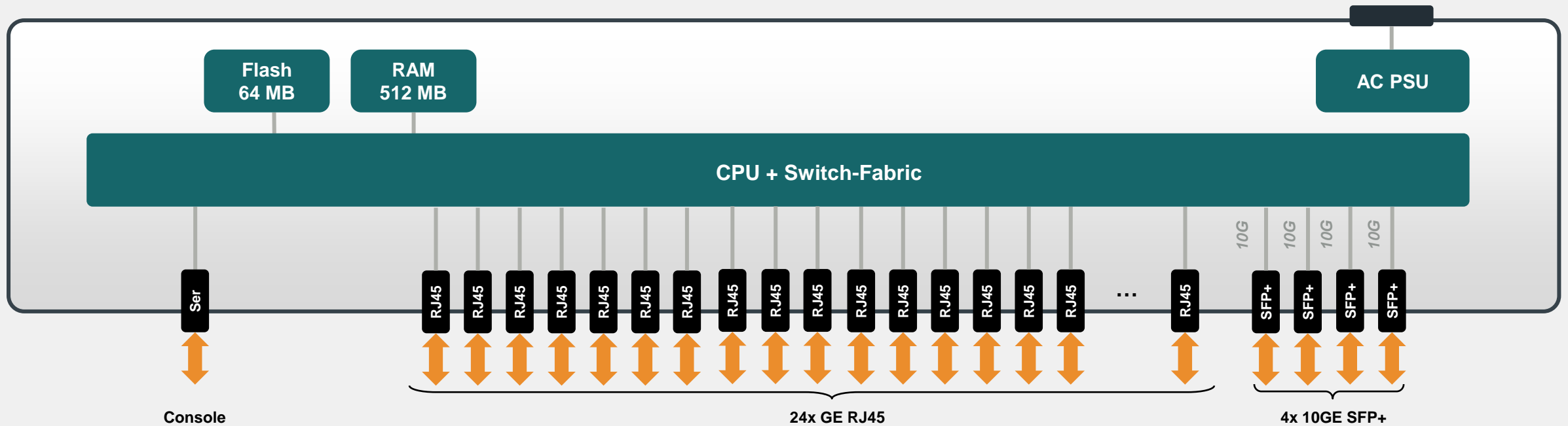
FortiSwitch 124E-POE Schematic



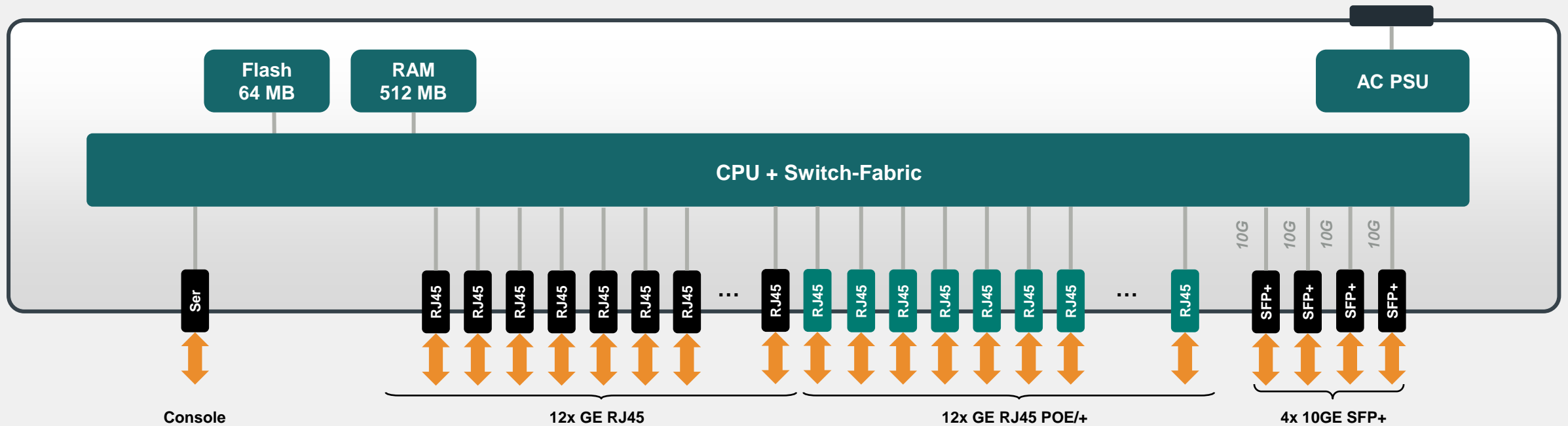
FortiSwitch 124E-FPOE Schematic



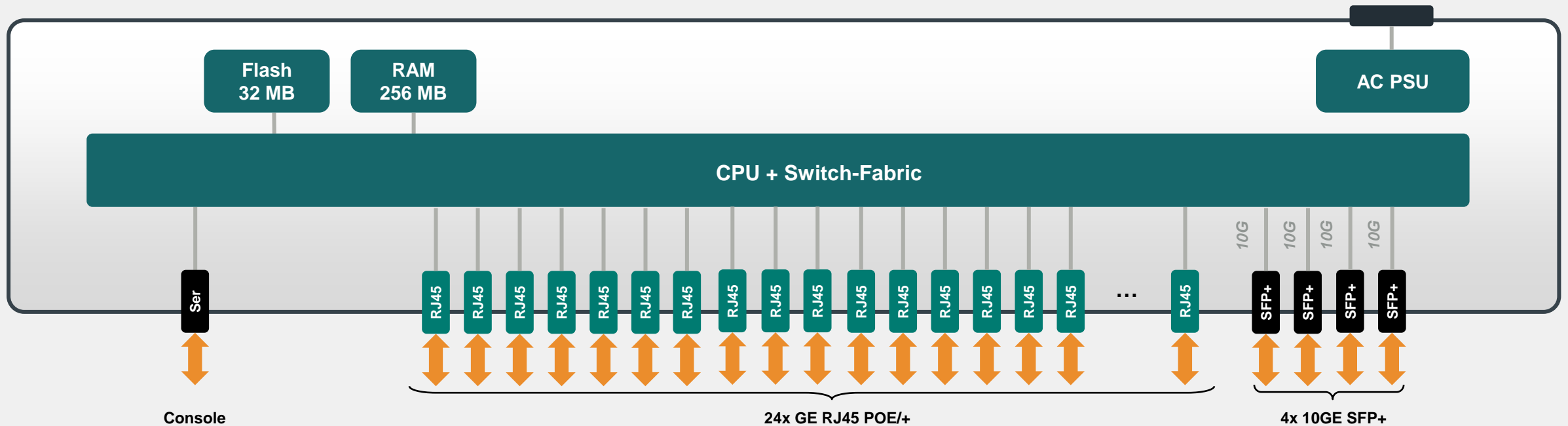
FortiSwitch 124F Schematic



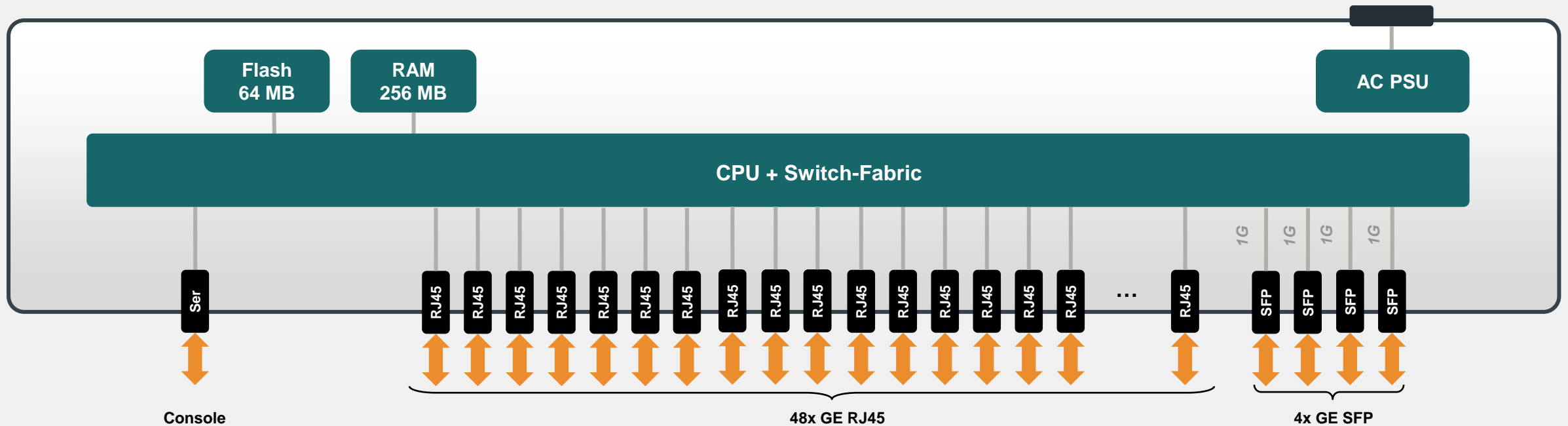
FortiSwitch 124F-POE Schematic



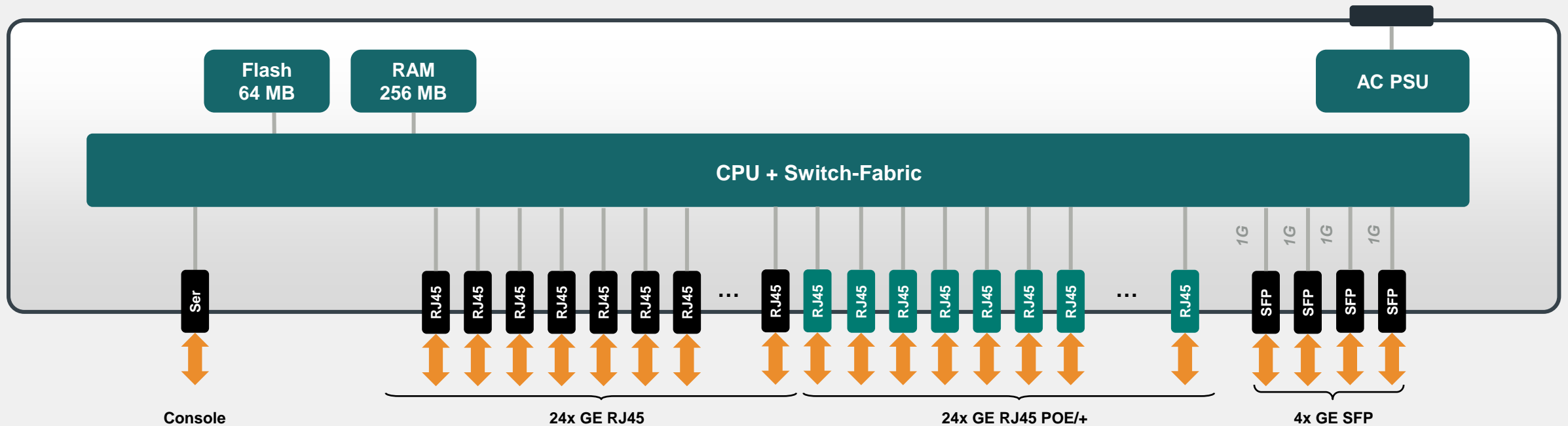
FortiSwitch 124F-FPOE Schematic



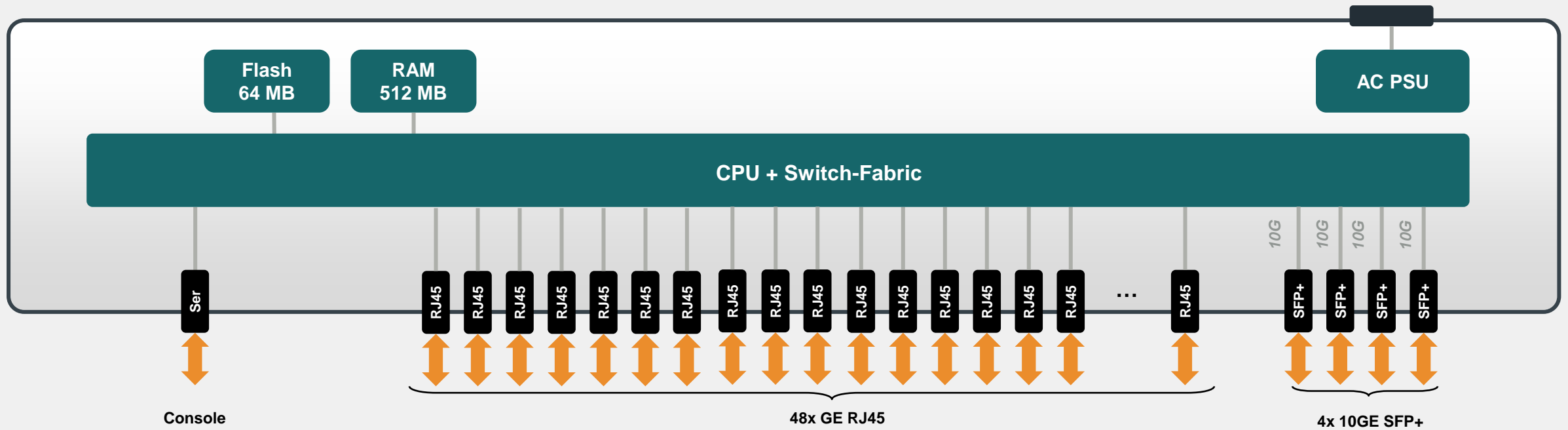
FortiSwitch 148E Schematic



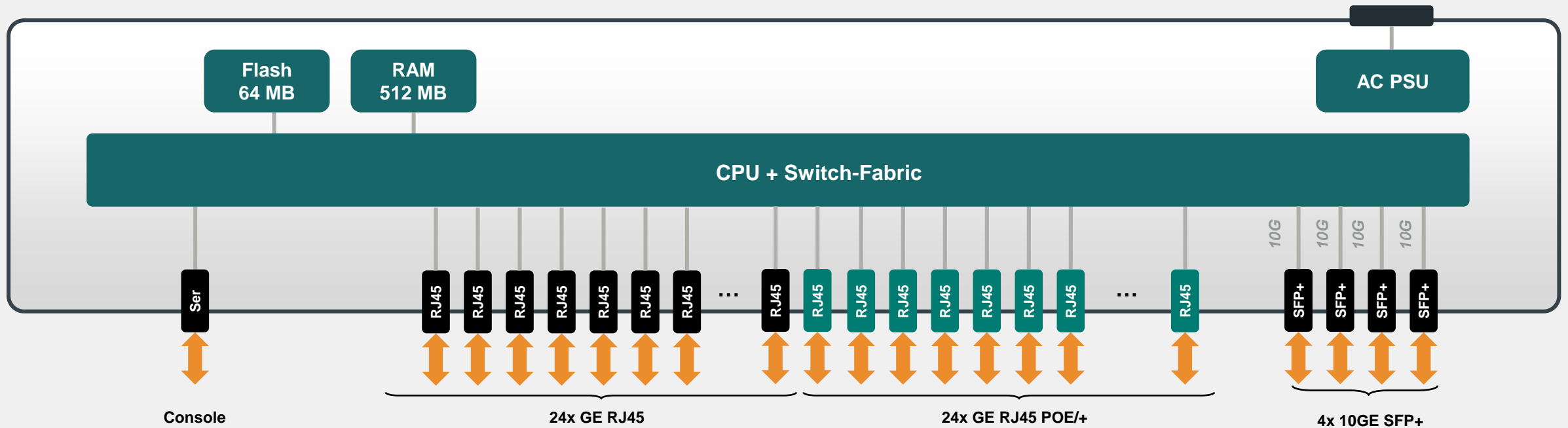
FortiSwitch 148E-POE Schematic



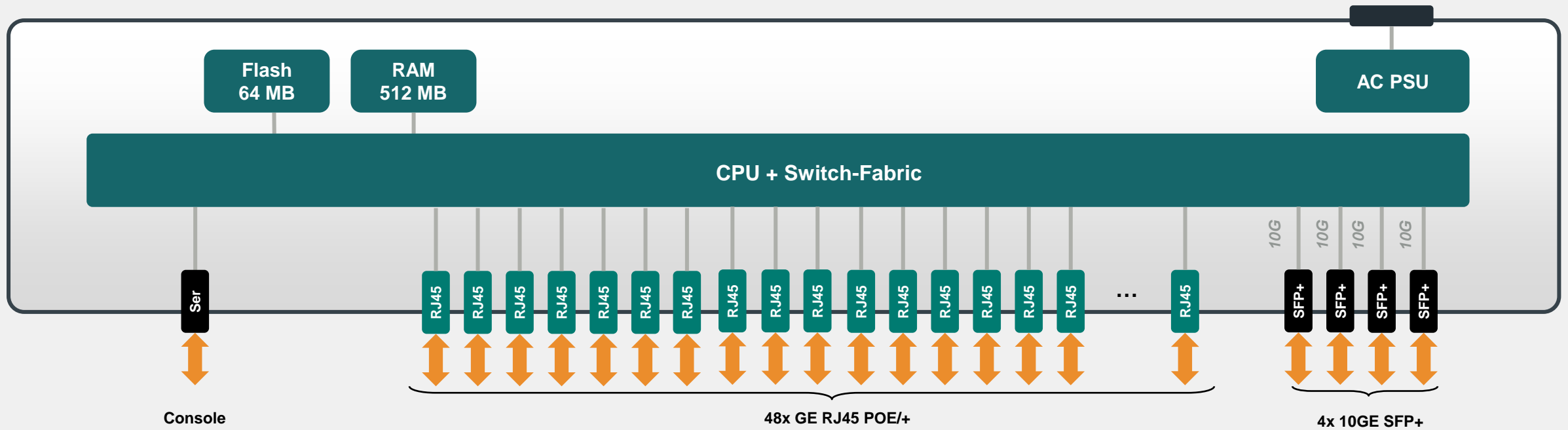
FortiSwitch 148F Schematic



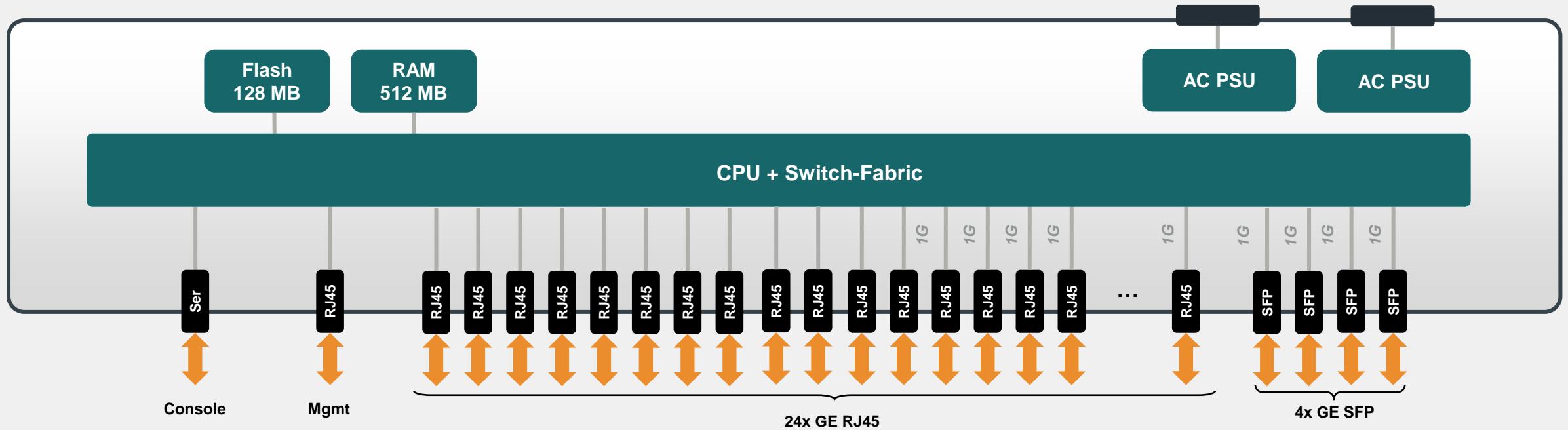
FortiSwitch 148F-POE Schematic



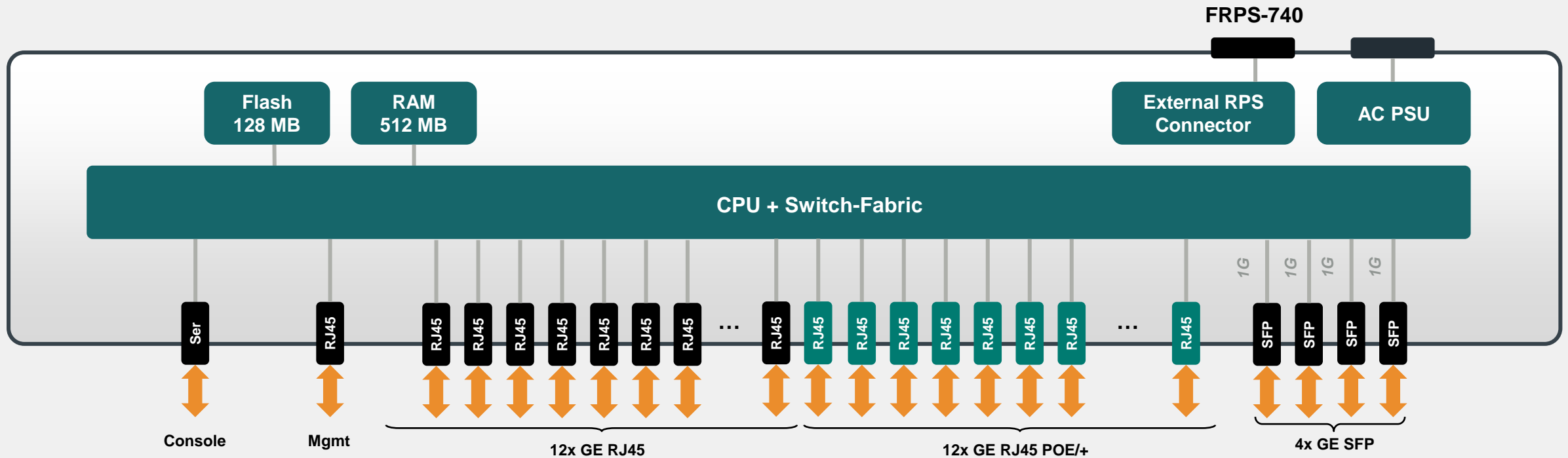
FortiSwitch 148F-FPOE Schematic



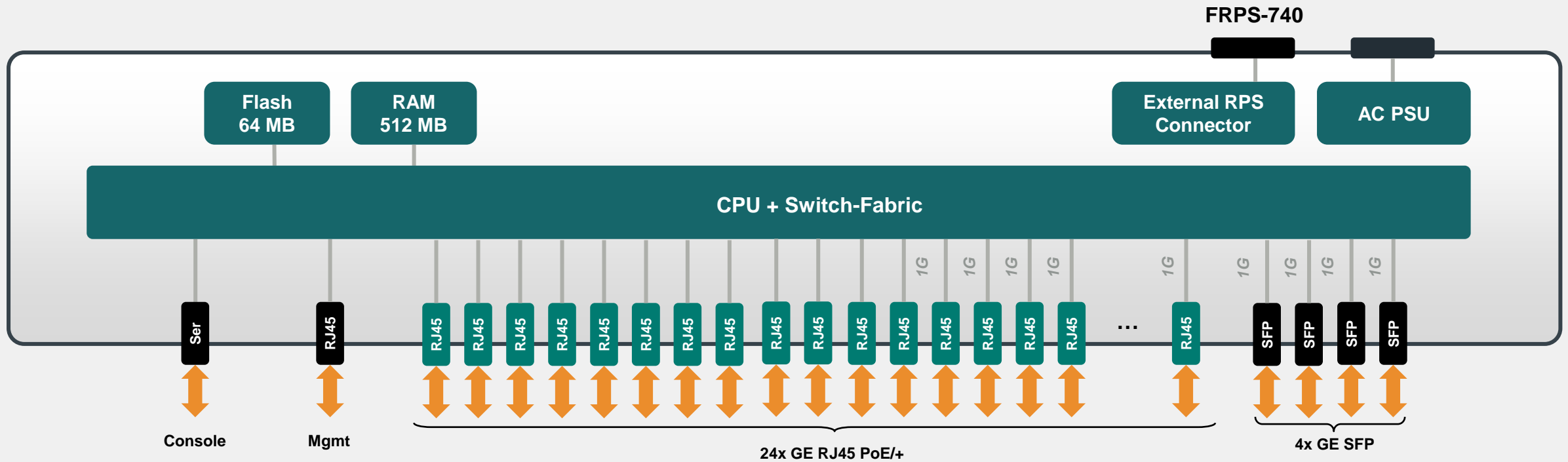
FortiSwitch 224E Schematic



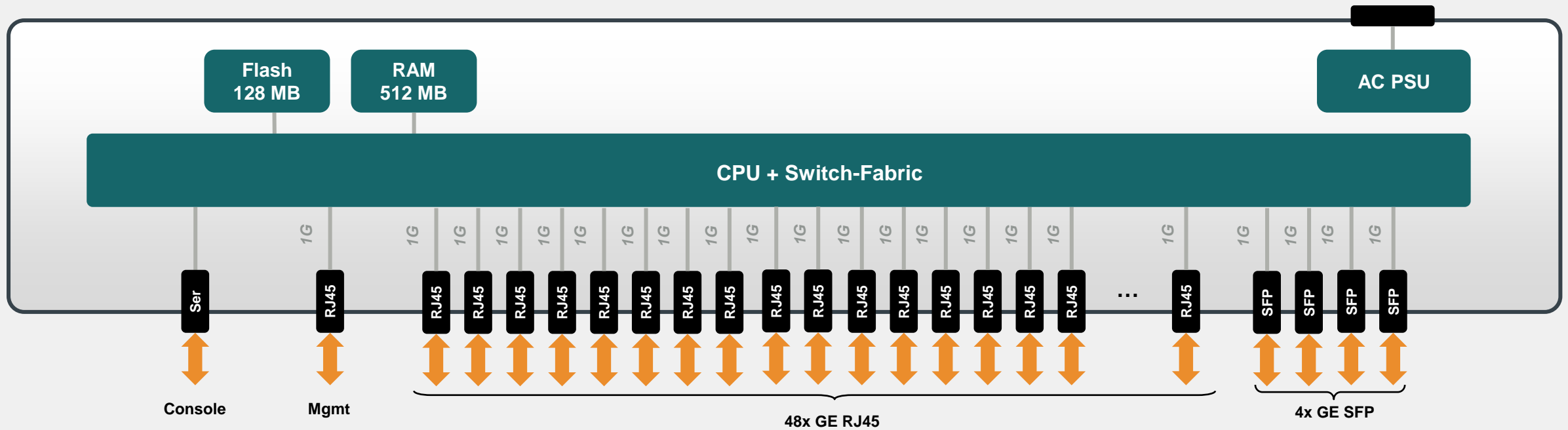
FortiSwitch 224E-POE Schematic



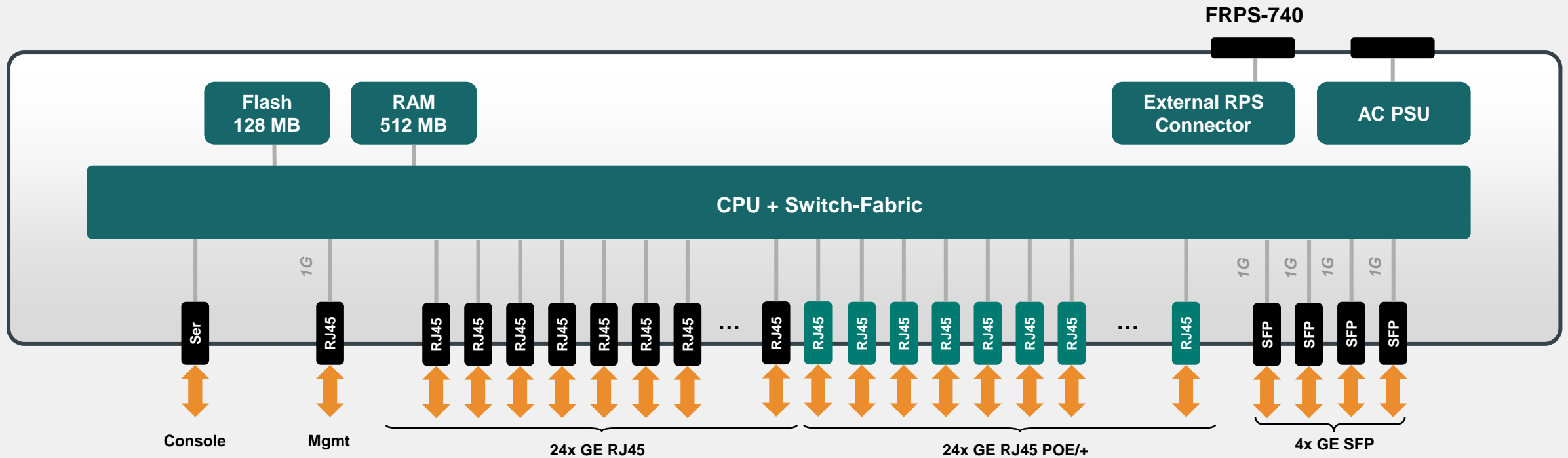
FortiSwitch 224D-FPOE Schematic



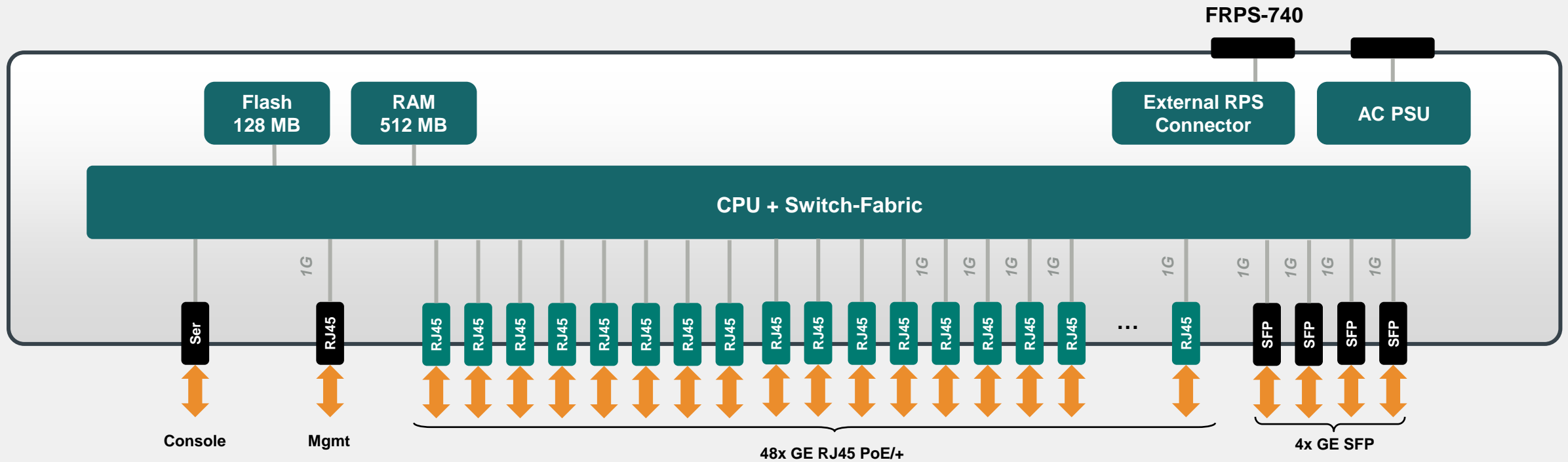
FortiSwitch 248D Schematic



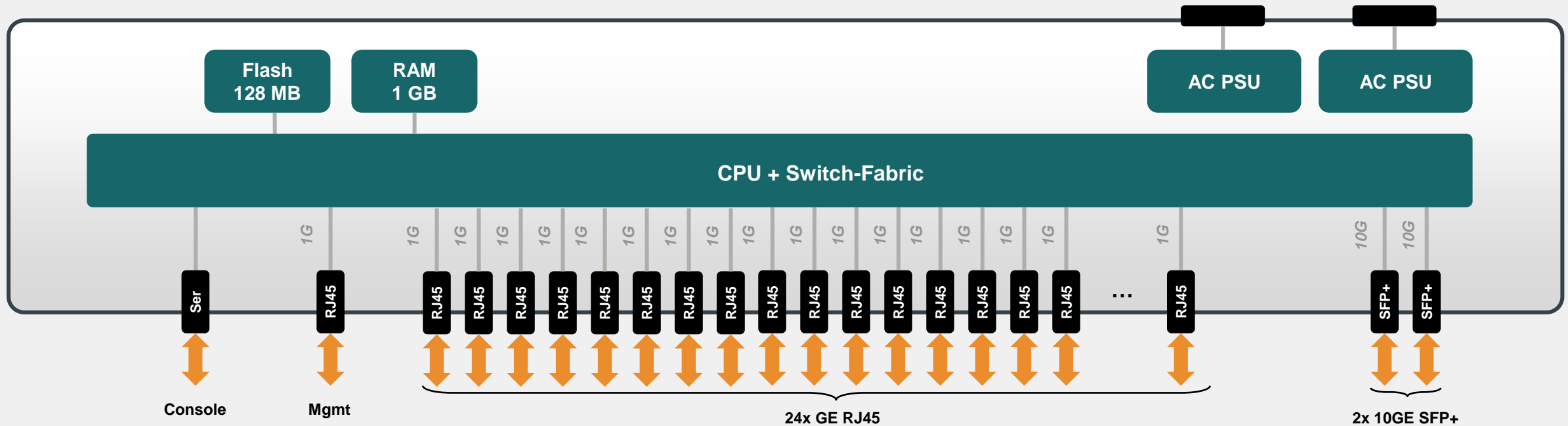
FortiSwitch 248E-POE Schematic



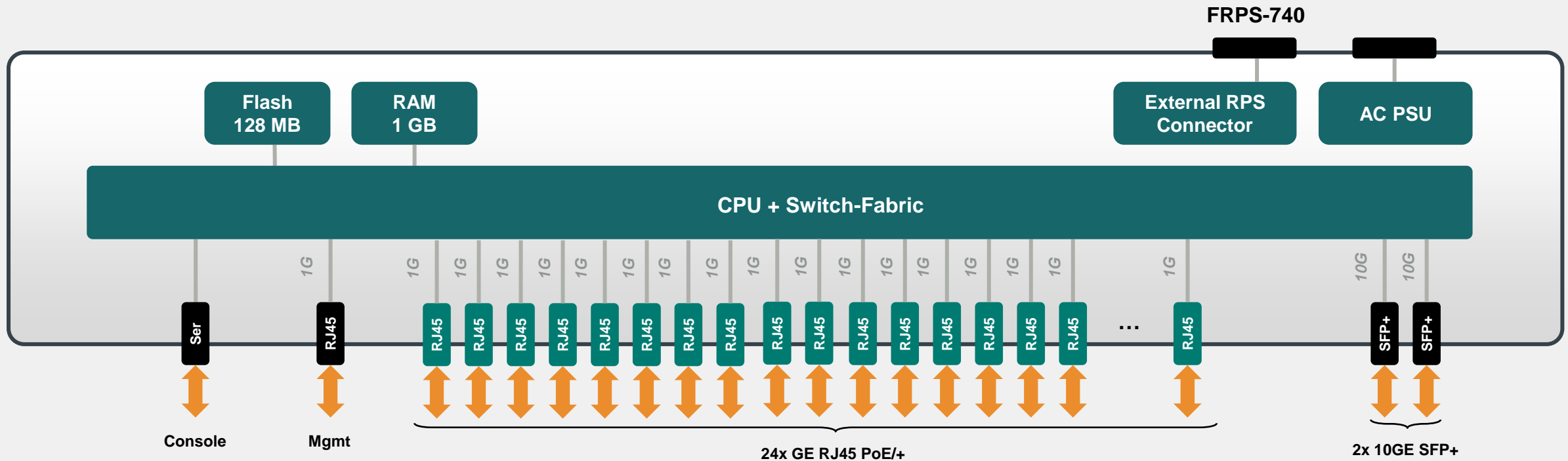
FortiSwitch 248E-FPOE Schematic



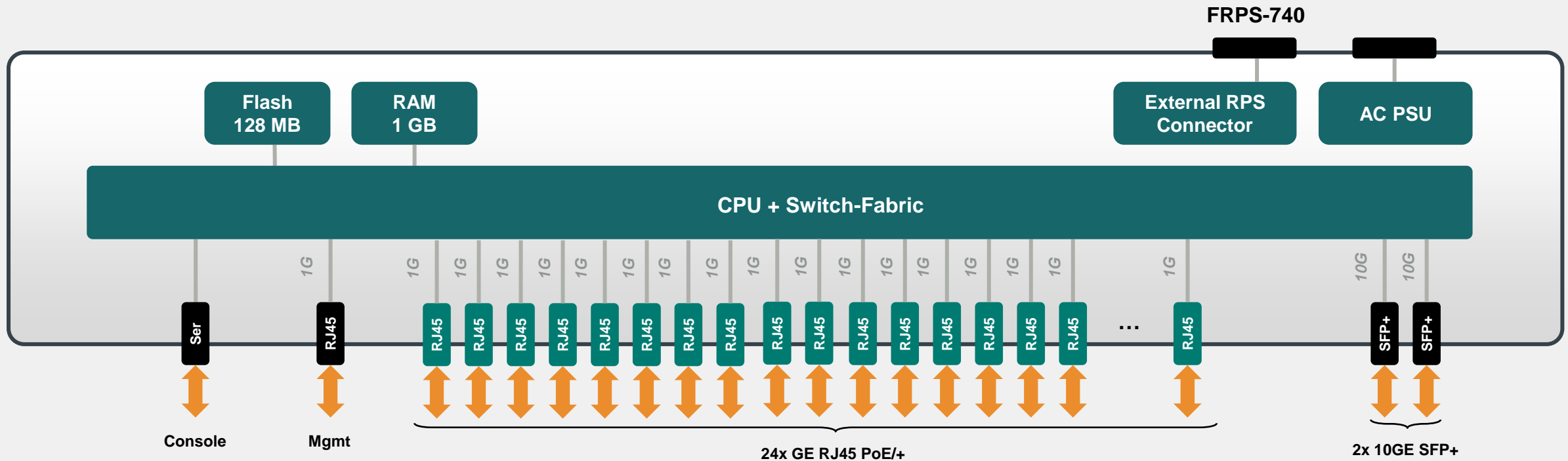
FortiSwitch 424D Schematic



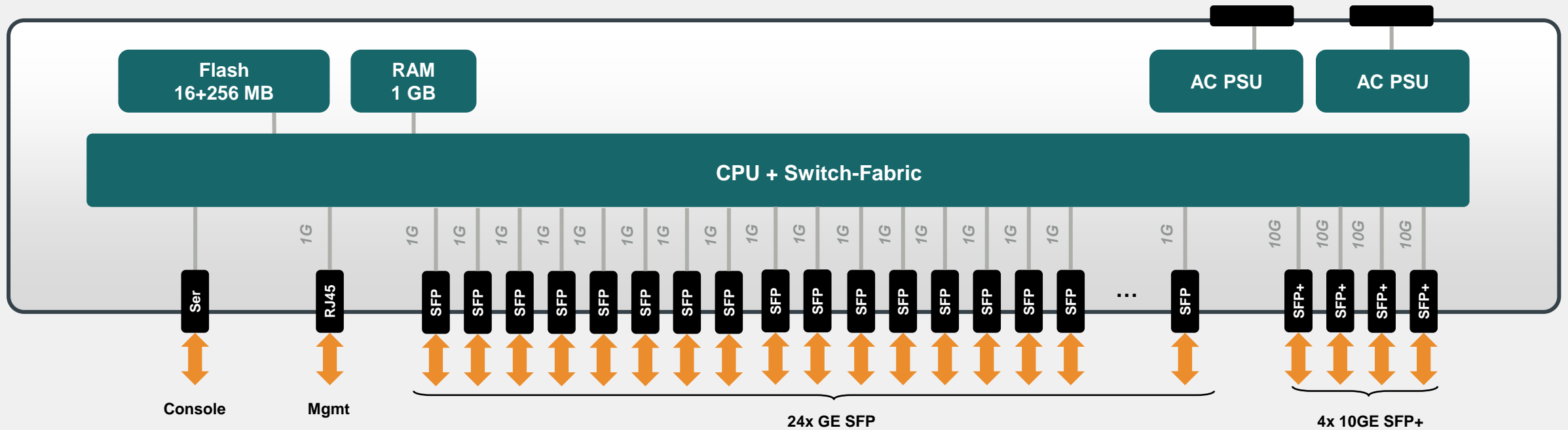
FortiSwitch 424D-POE Schematic



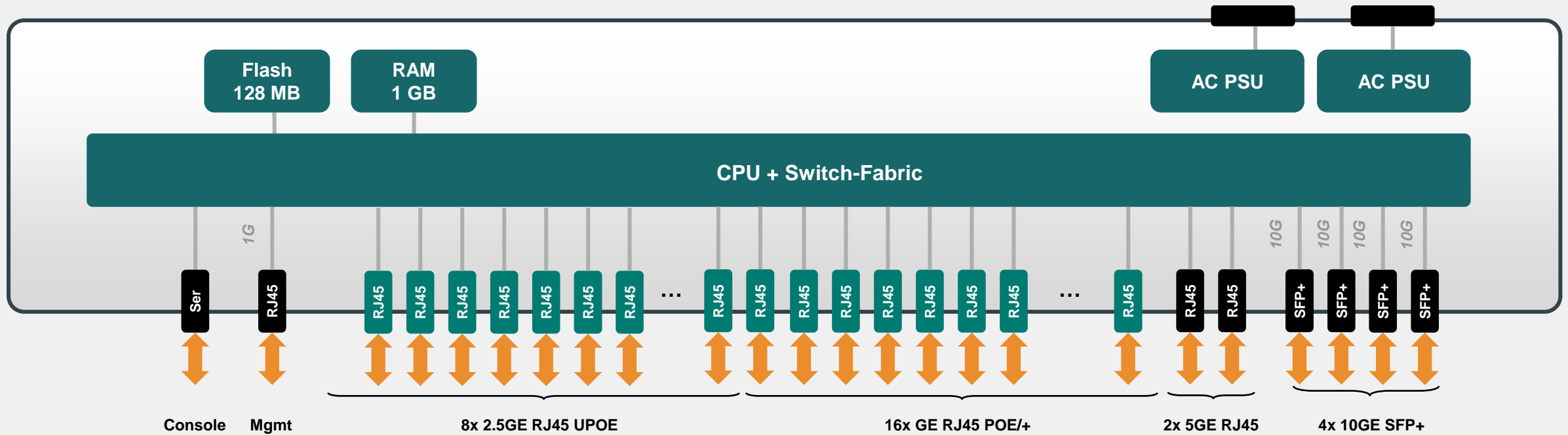
FortiSwitch 424D-FPOE Schematic



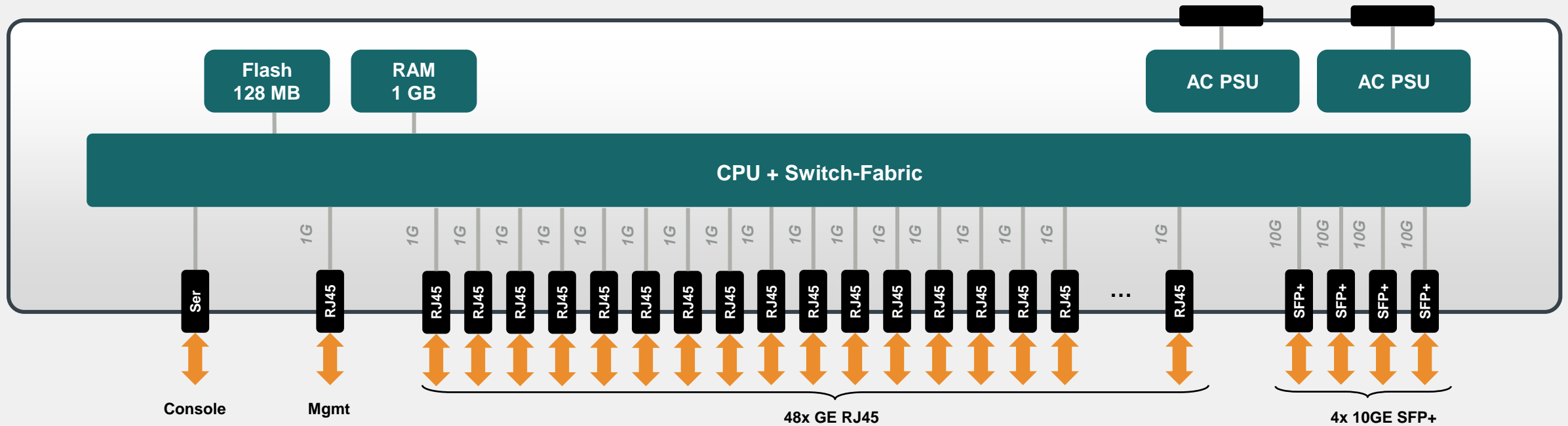
FortiSwitch 424E-FIBER Schematic



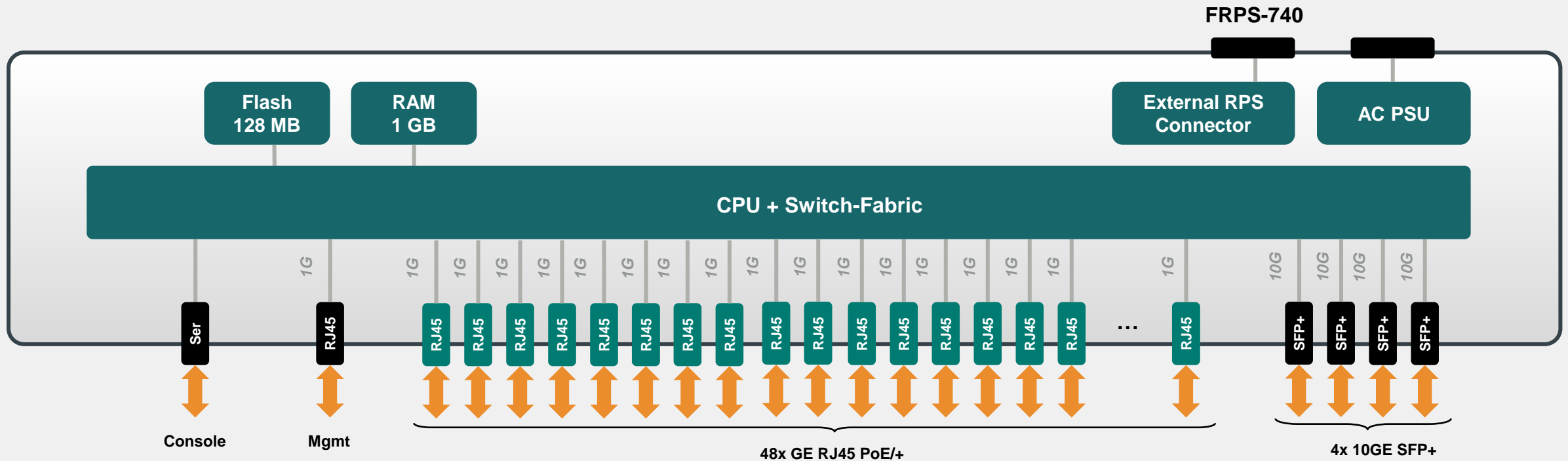
FortiSwitch M426E-FPOE Schematic



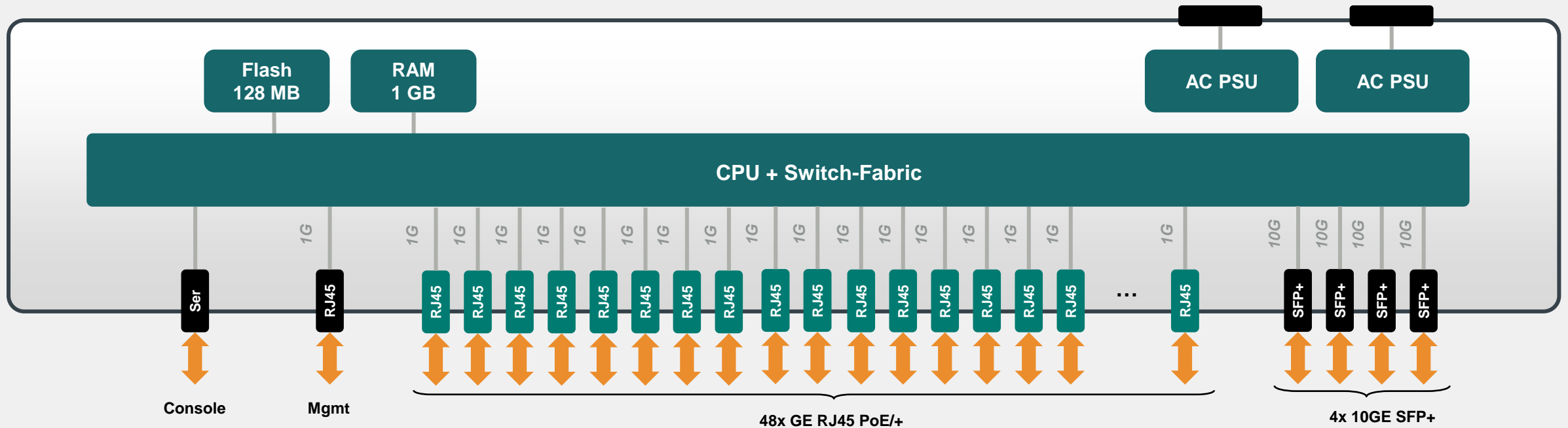
FortiSwitch 448D Schematic



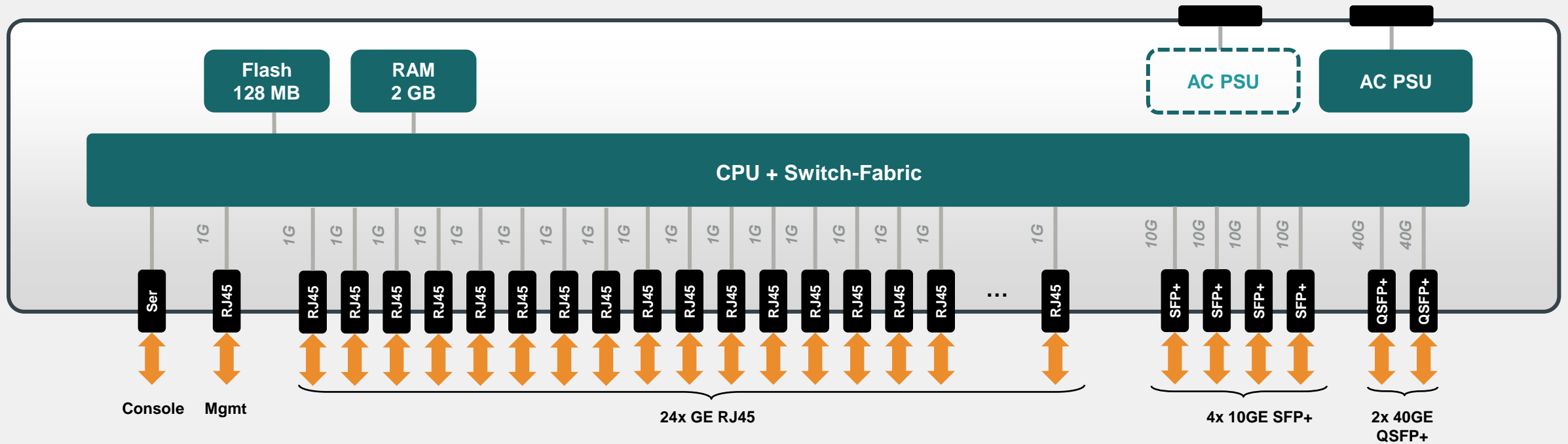
FortiSwitch 448D-POE Schematic



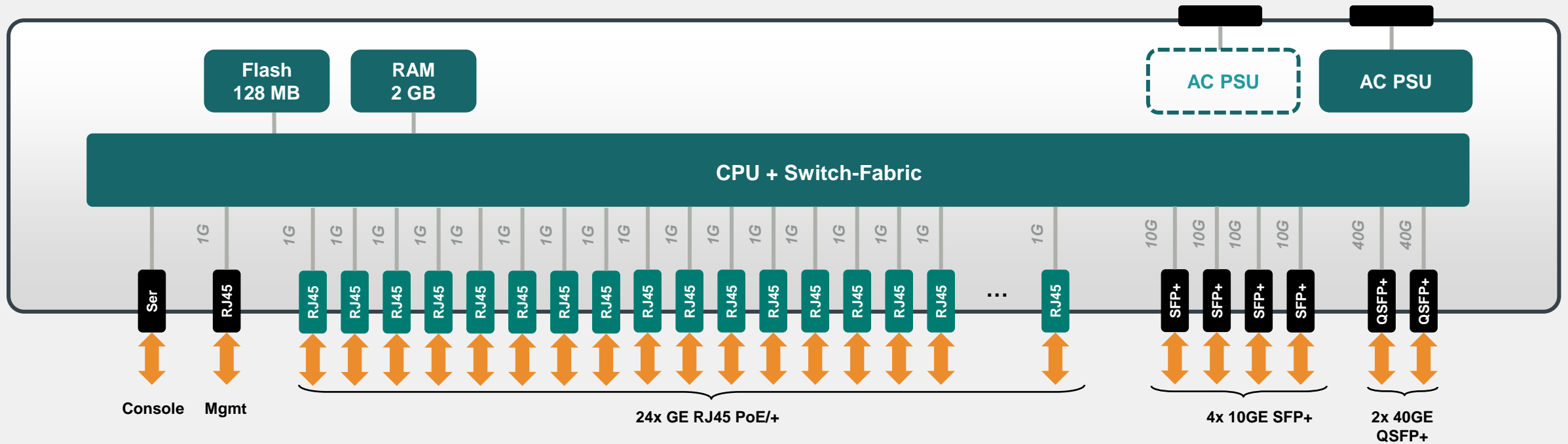
FortiSwitch 448D-FPOE Schematic



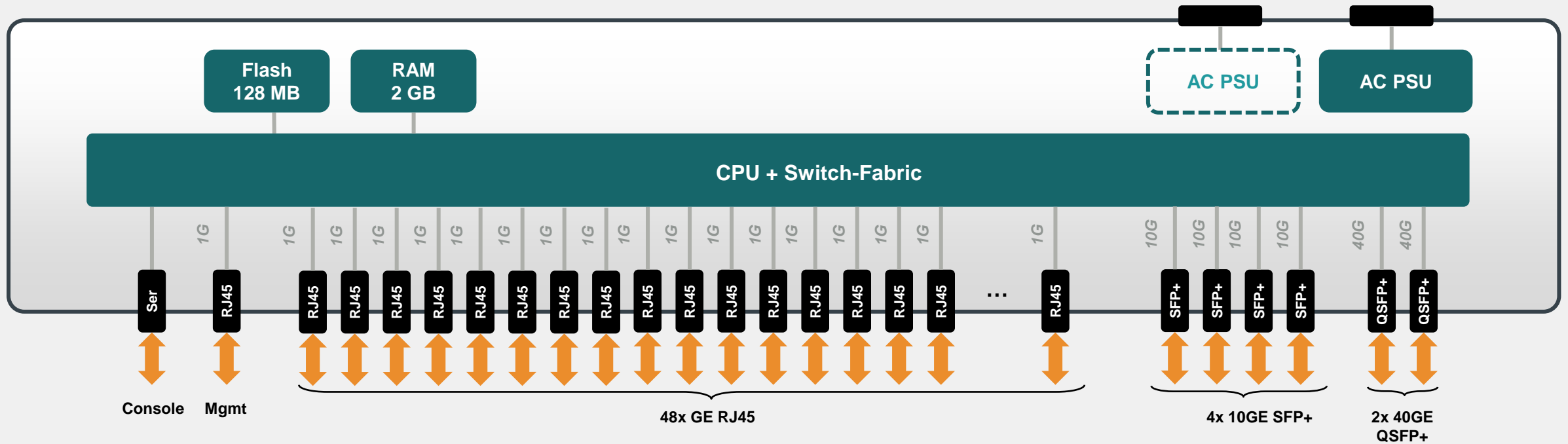
FortiSwitch 524D Schematic



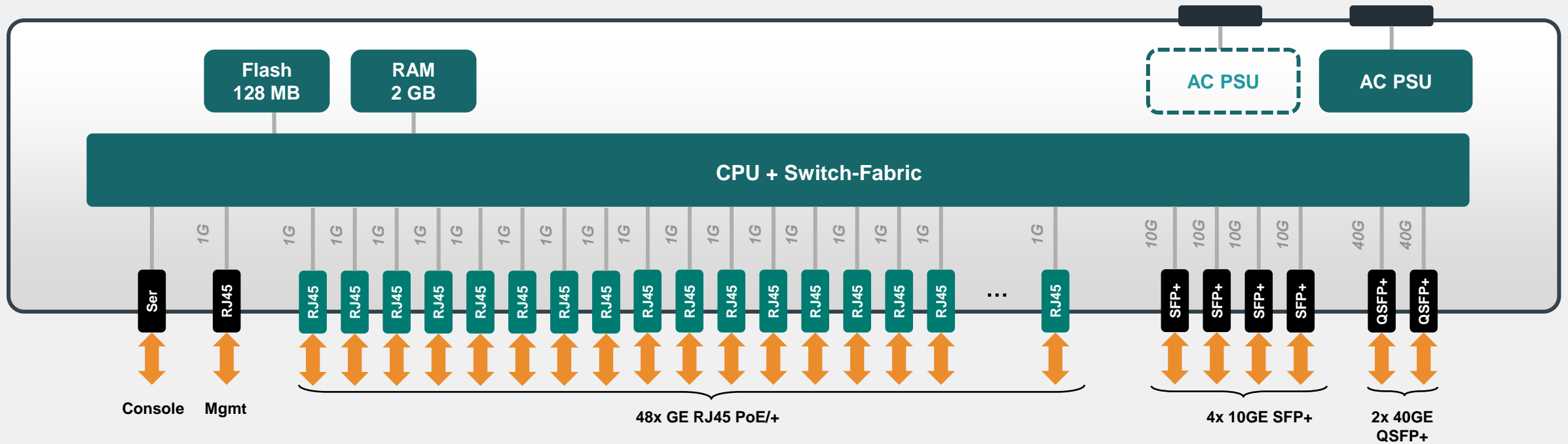
FortiSwitch 524D-FPOE Schematic



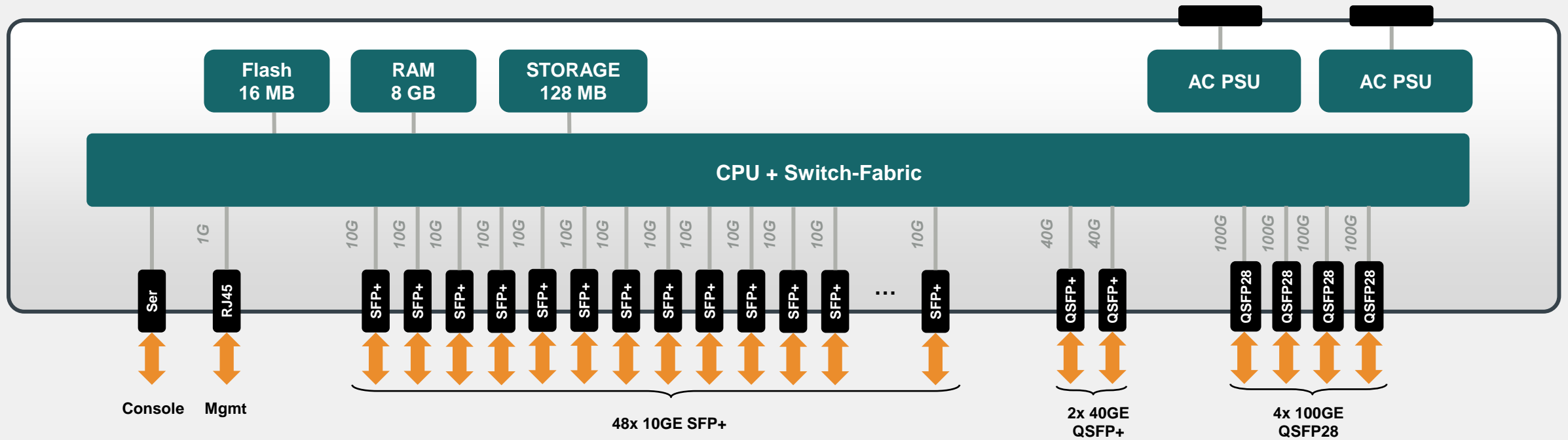
FortiSwitch 548D Schematic



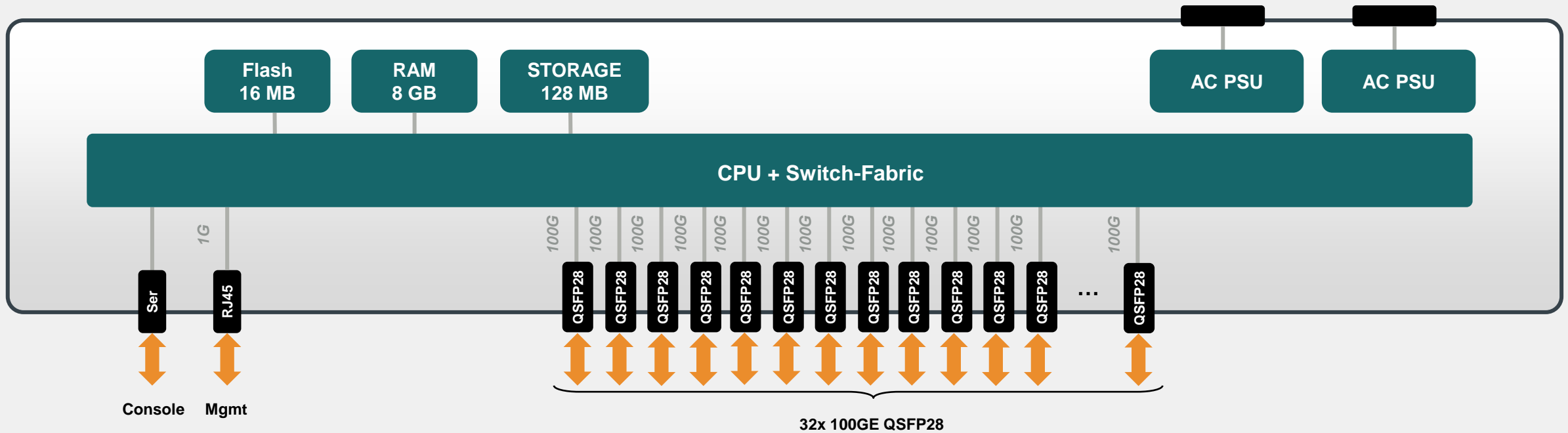
FortiSwitch 548D-FPOE Schematic



FortiSwitch 1048E Schematic



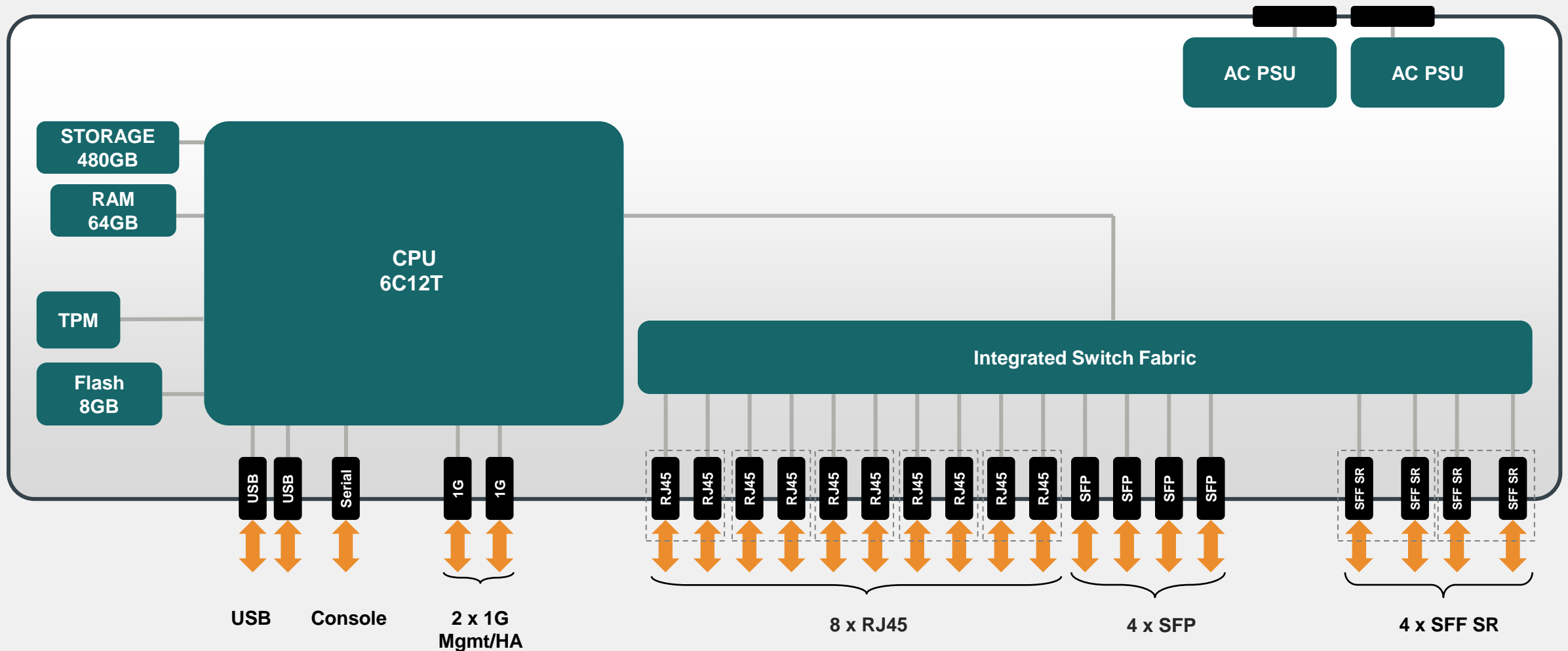
FortiSwitch 3032E Schematic



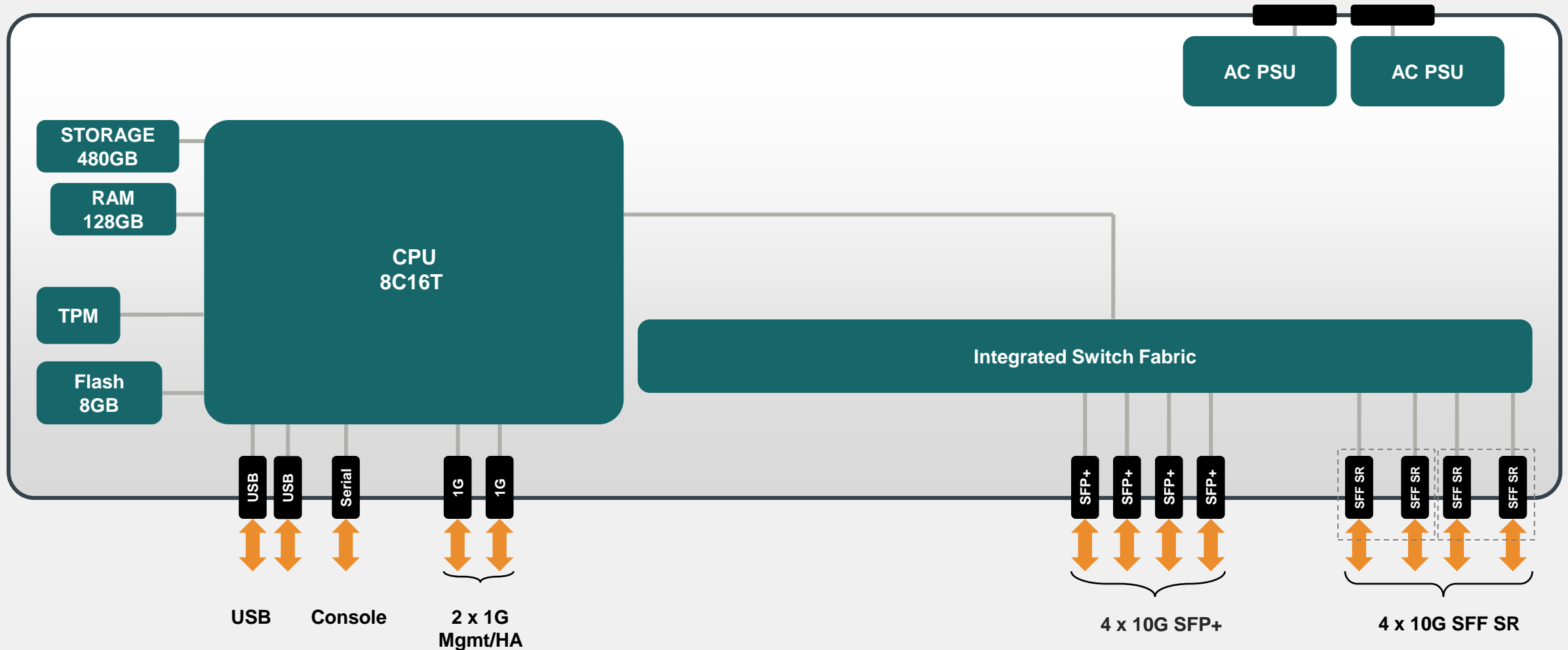
FortiDDoS



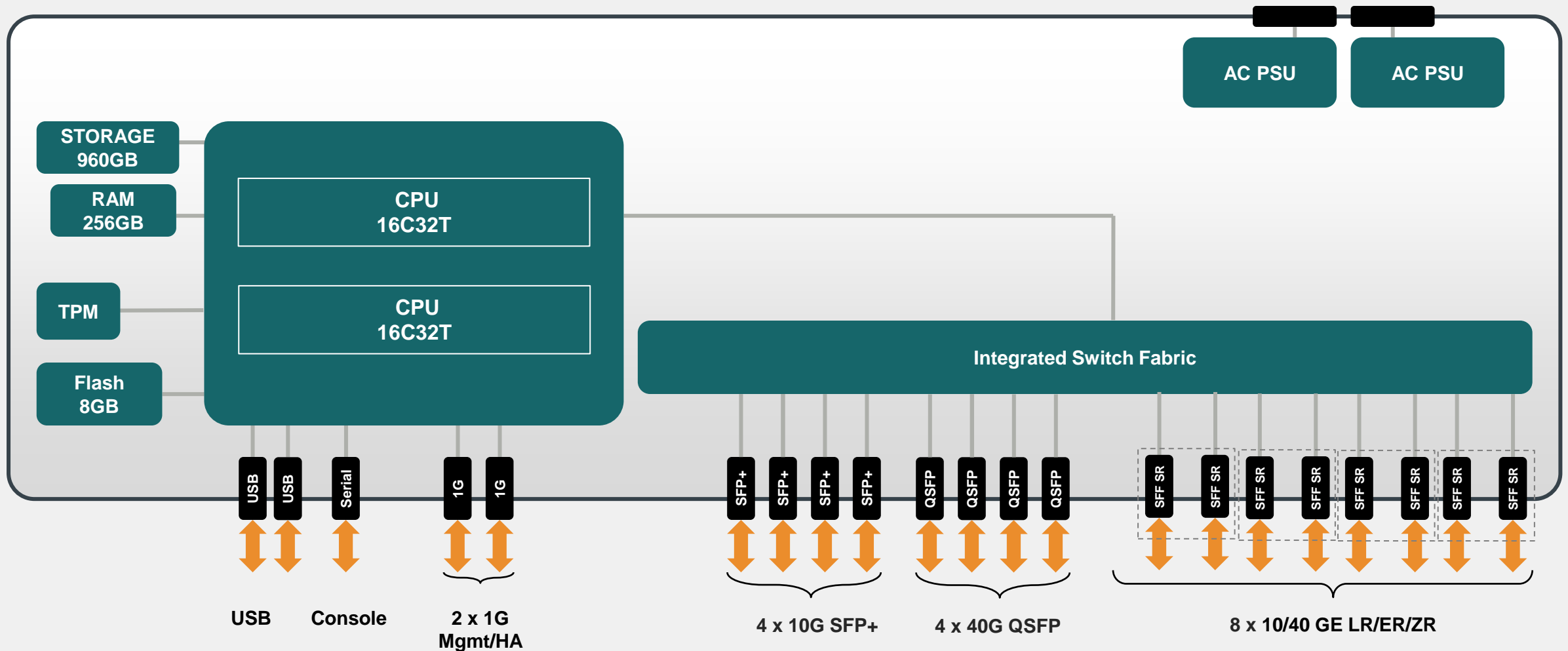
FortiDDoS 200F Schematic



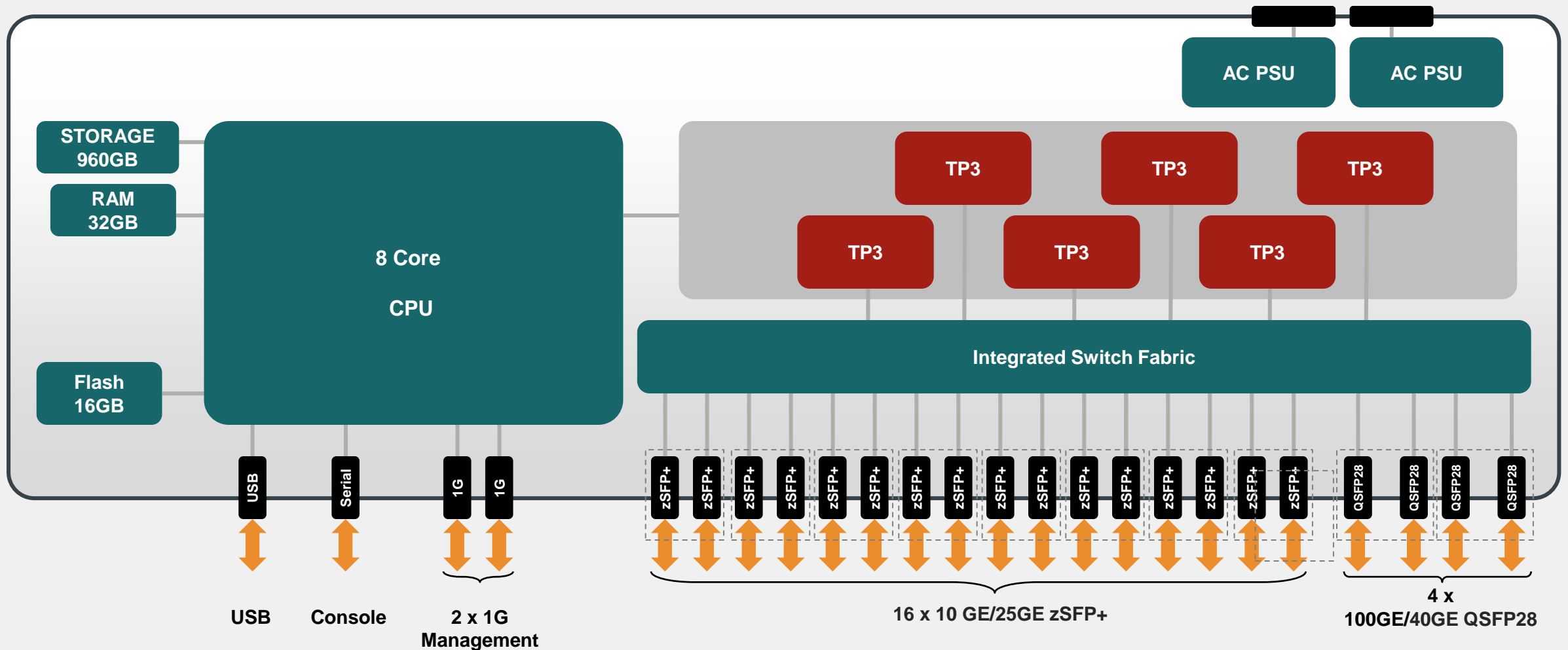
FortiDDoS 1500F Schematic



FortiDDoS 2000F Schematic



FortiDDoS 2000E Schematic

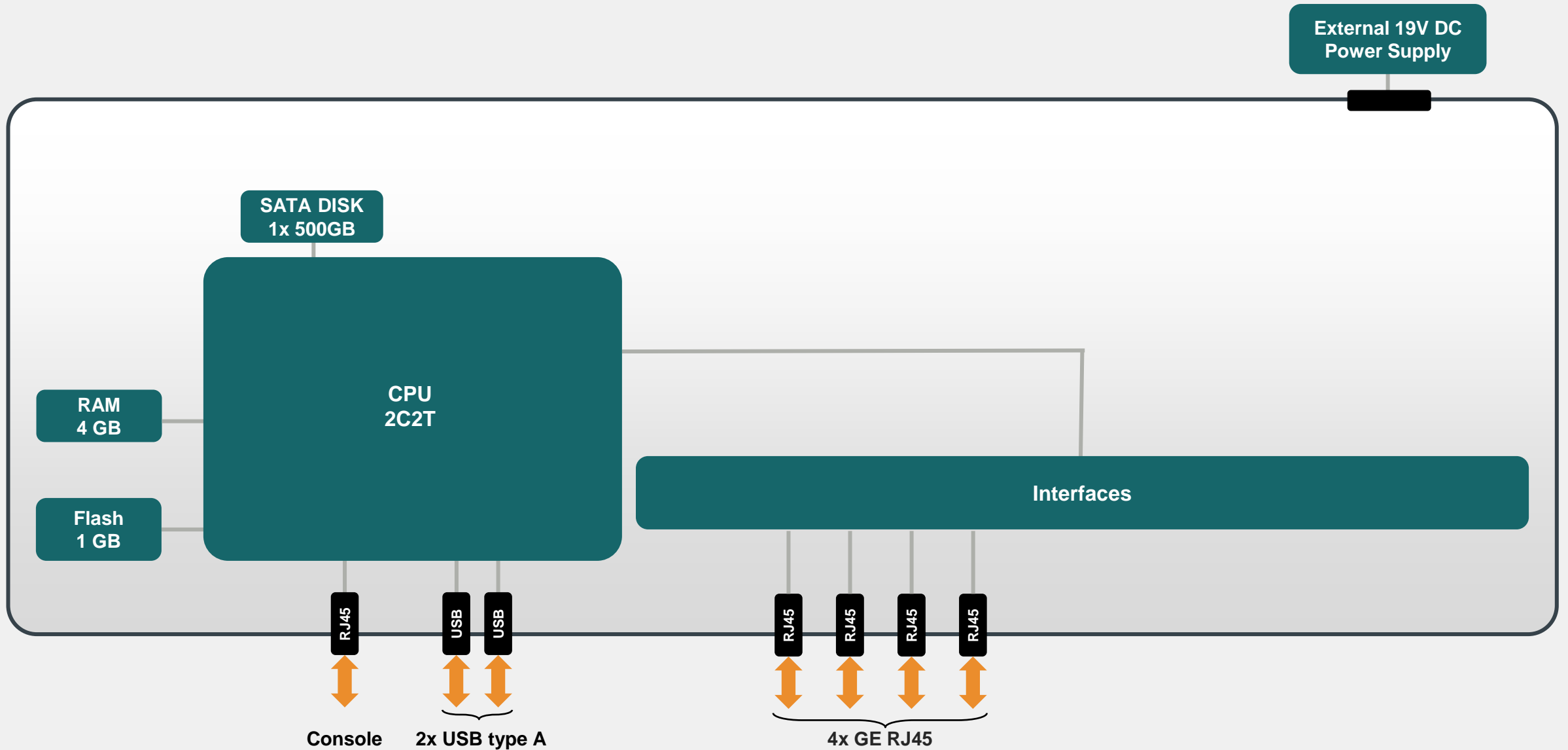




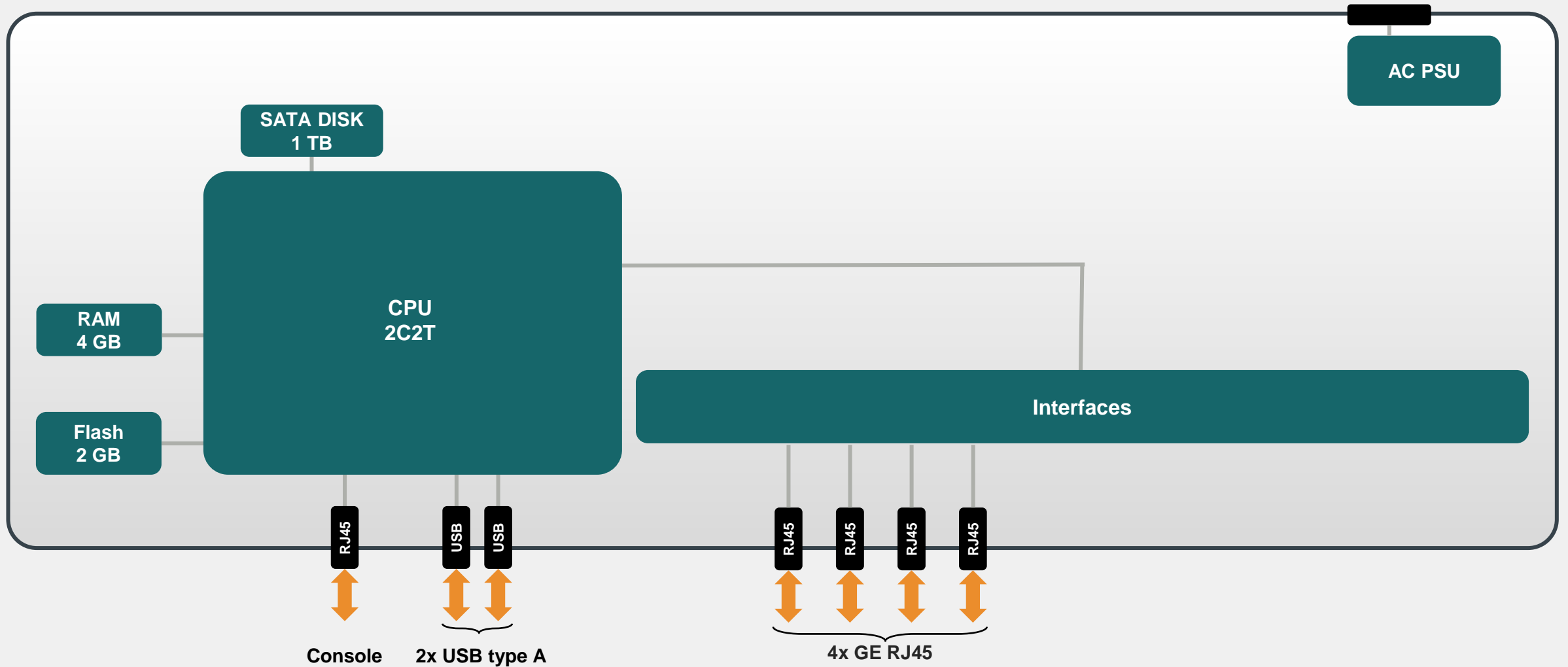
FortiMail



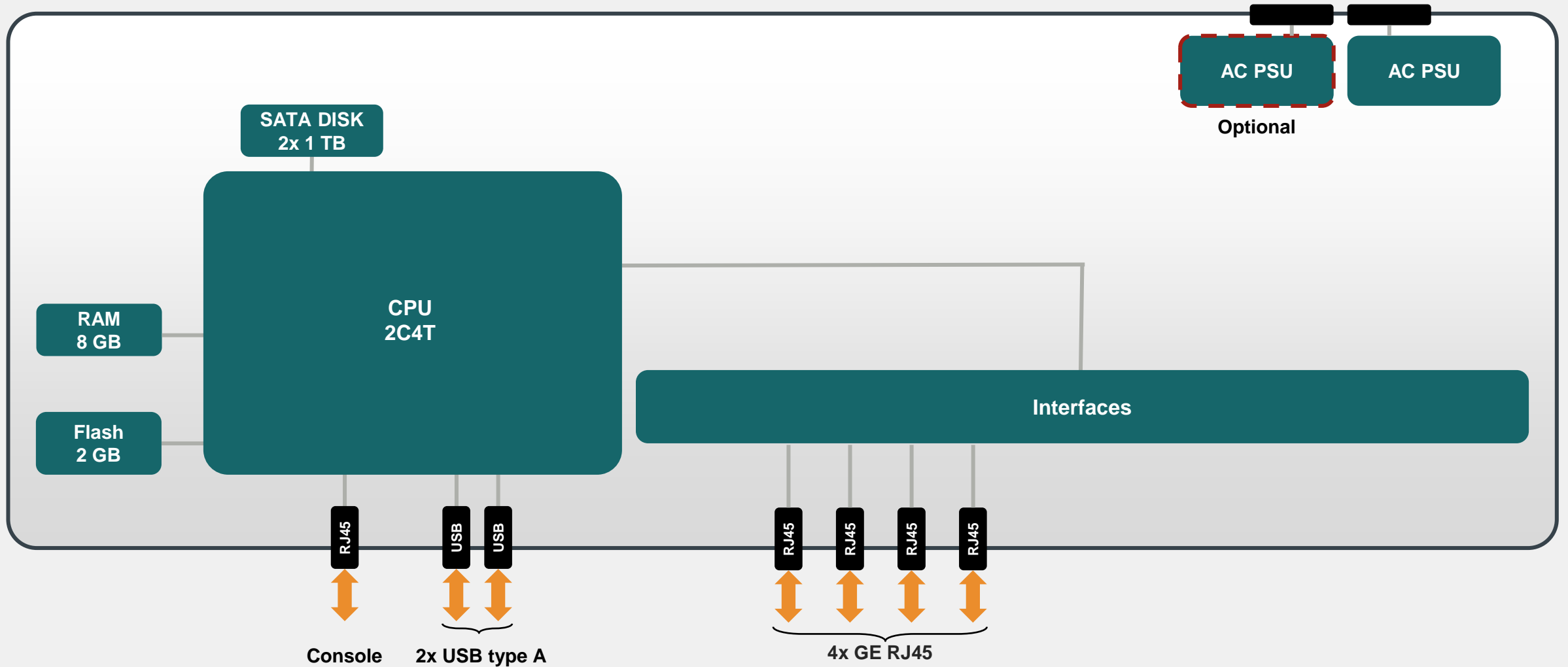
FortiMail 60D Schematic



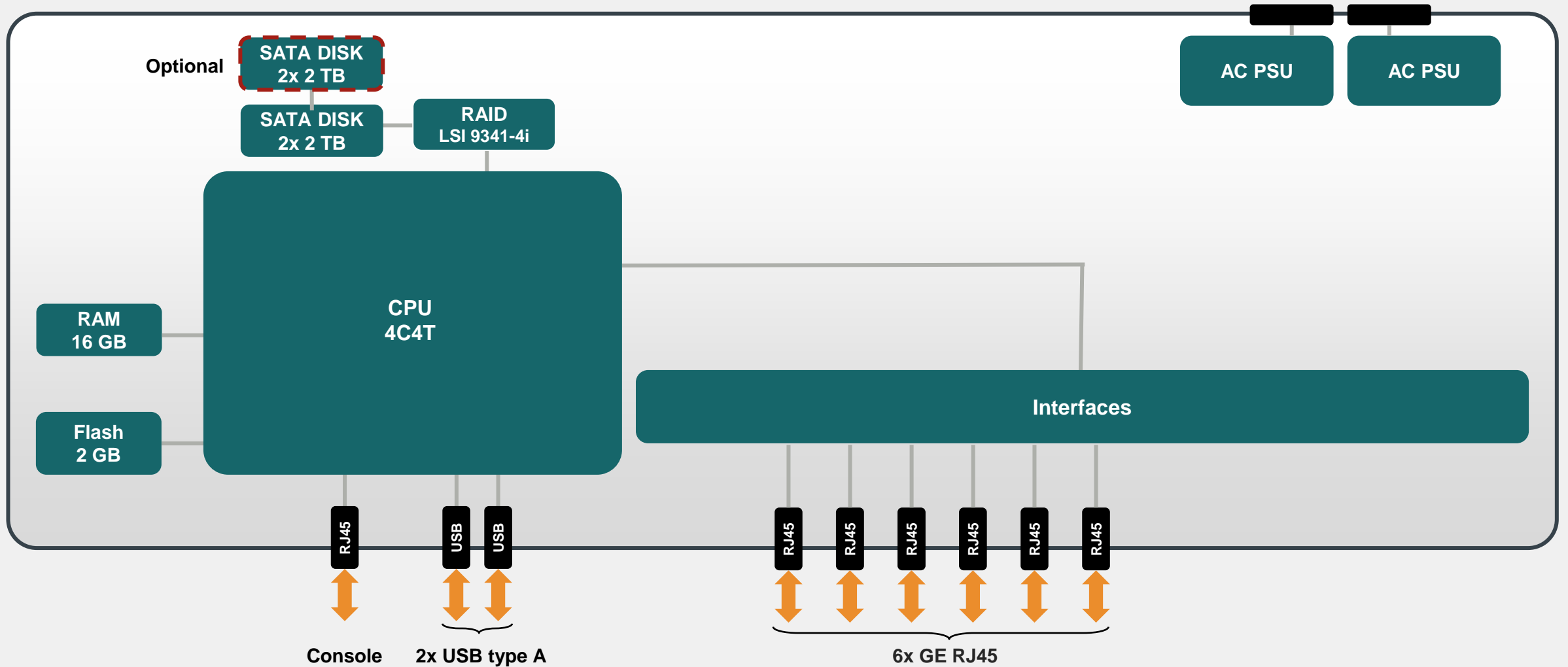
FortiMail 200F Schematic



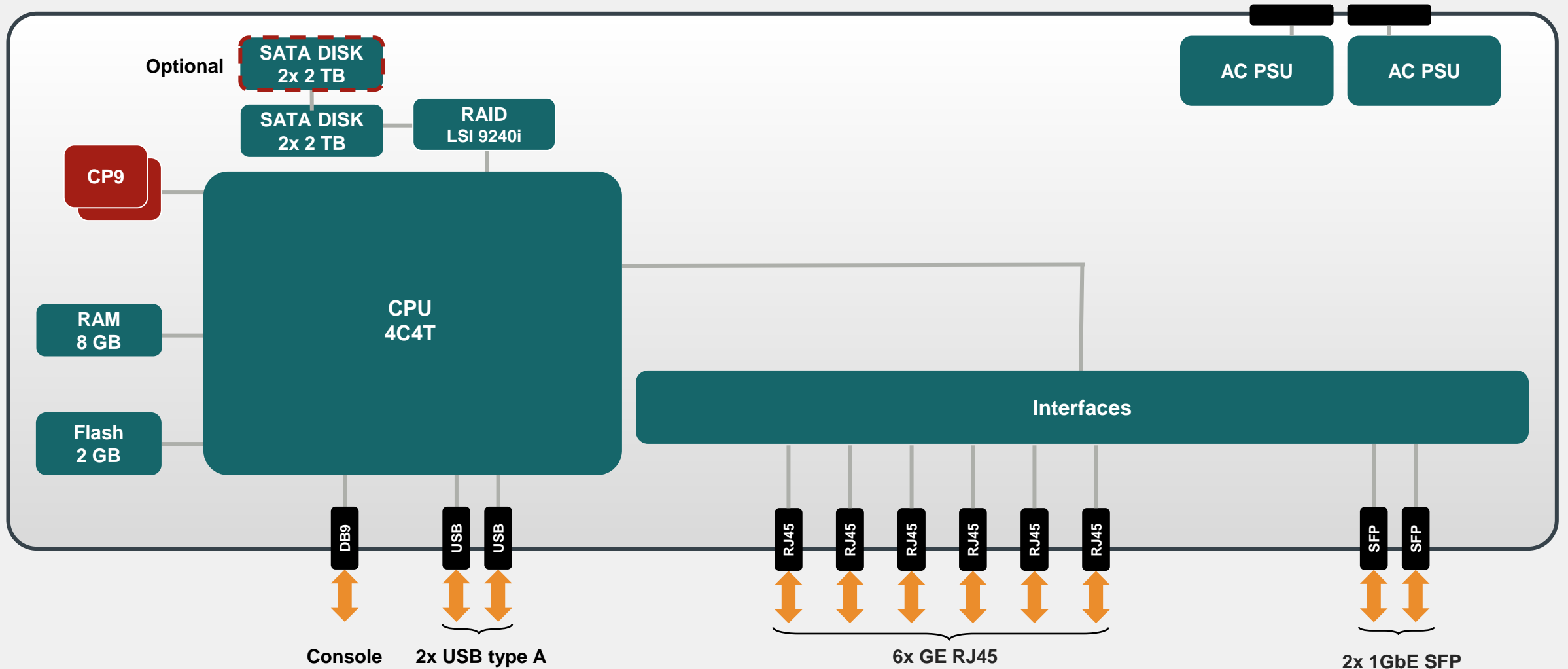
FortiMail 400F Schematic



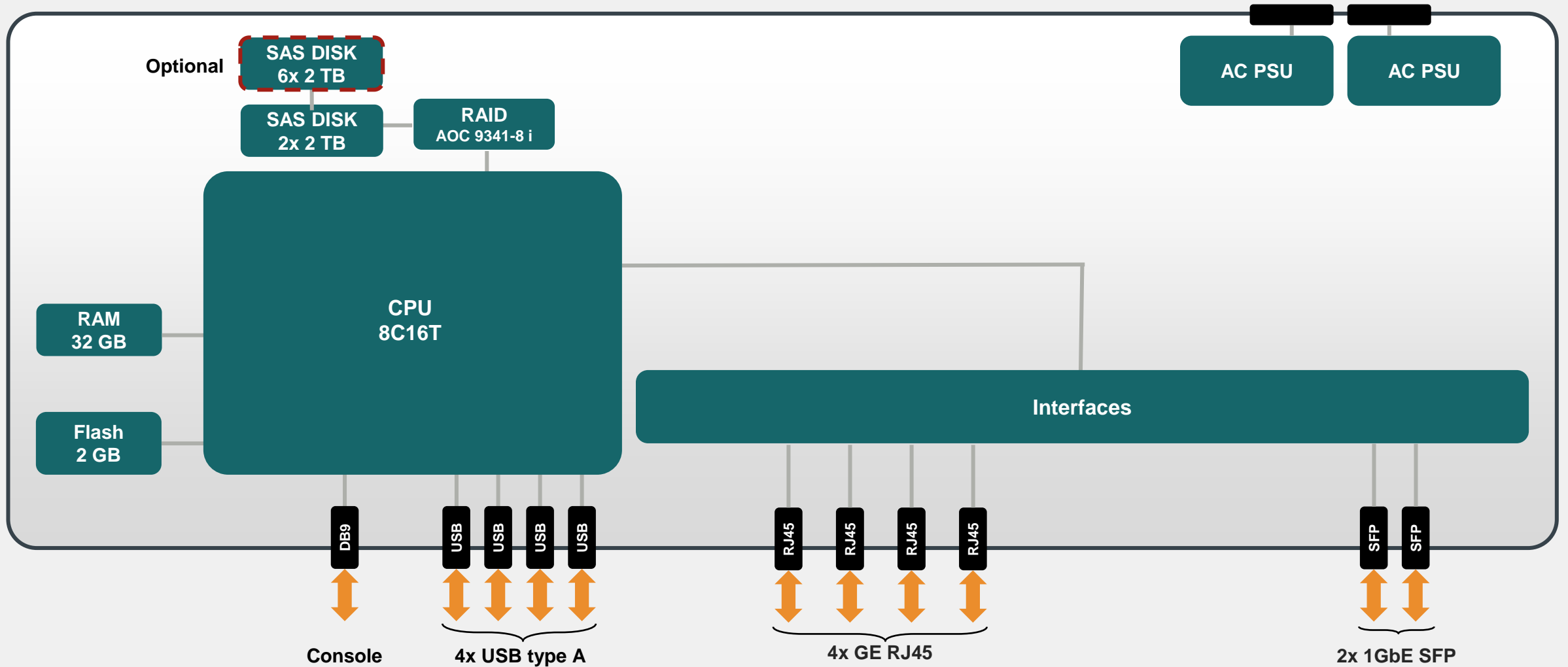
FortiMail 900F Schematic



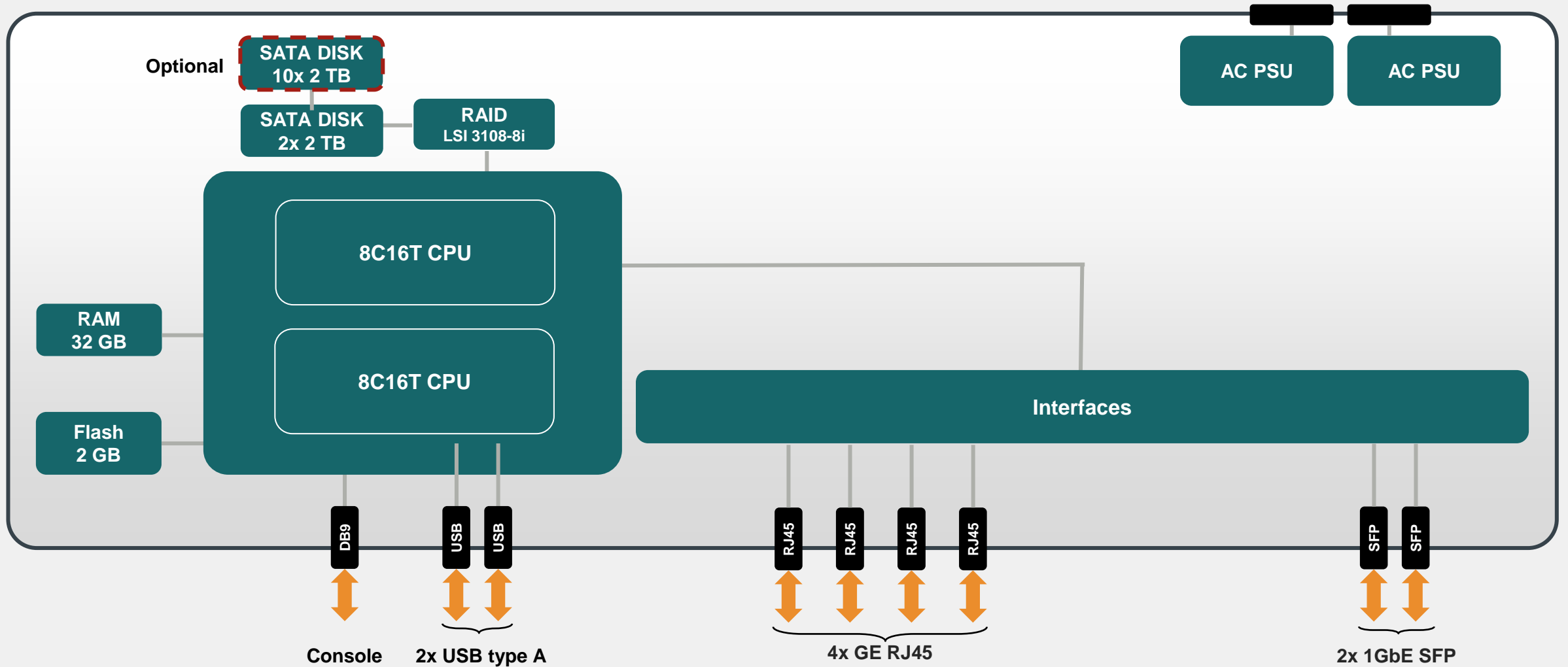
FortiMail 1000D Schematic



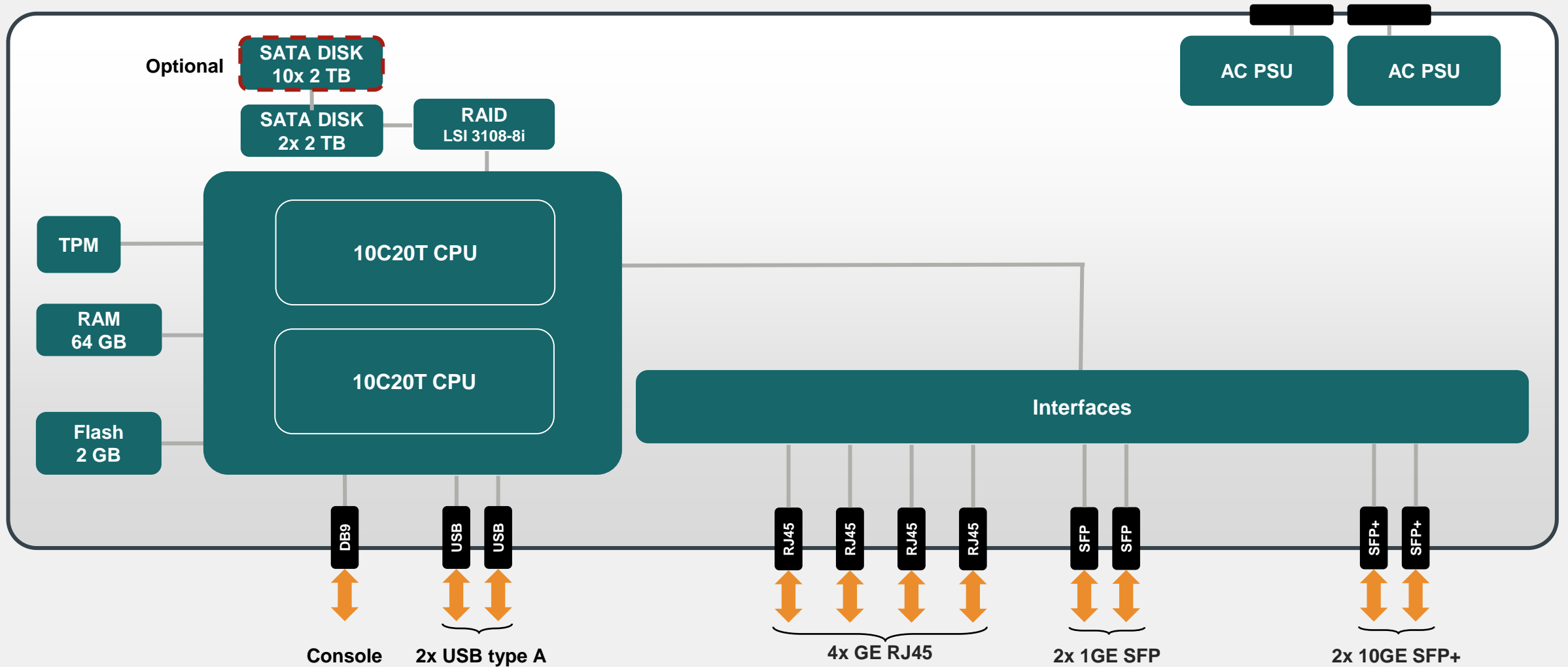
FortiMail 2000E Schematic



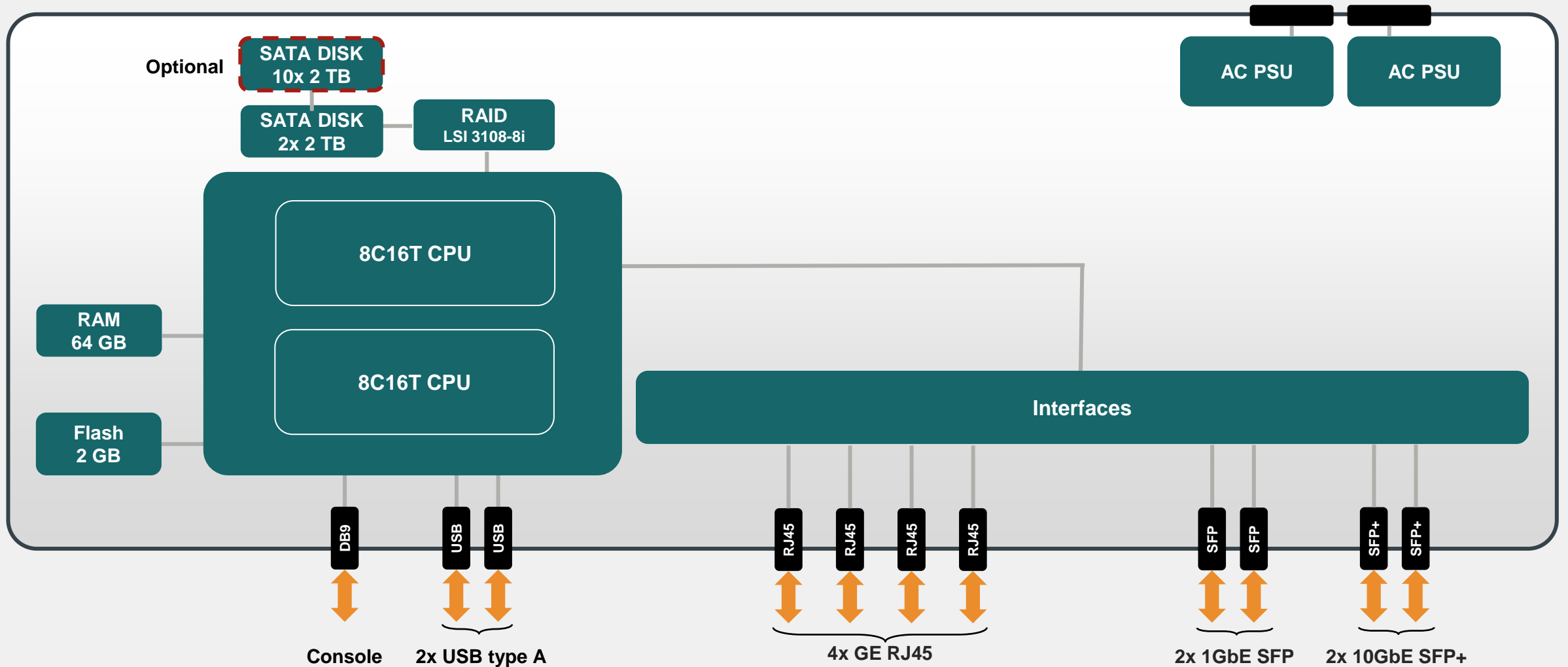
FortiMail 3000E Schematic



FortiMail 3000F Schematic



FortiMail 3200E Schematic

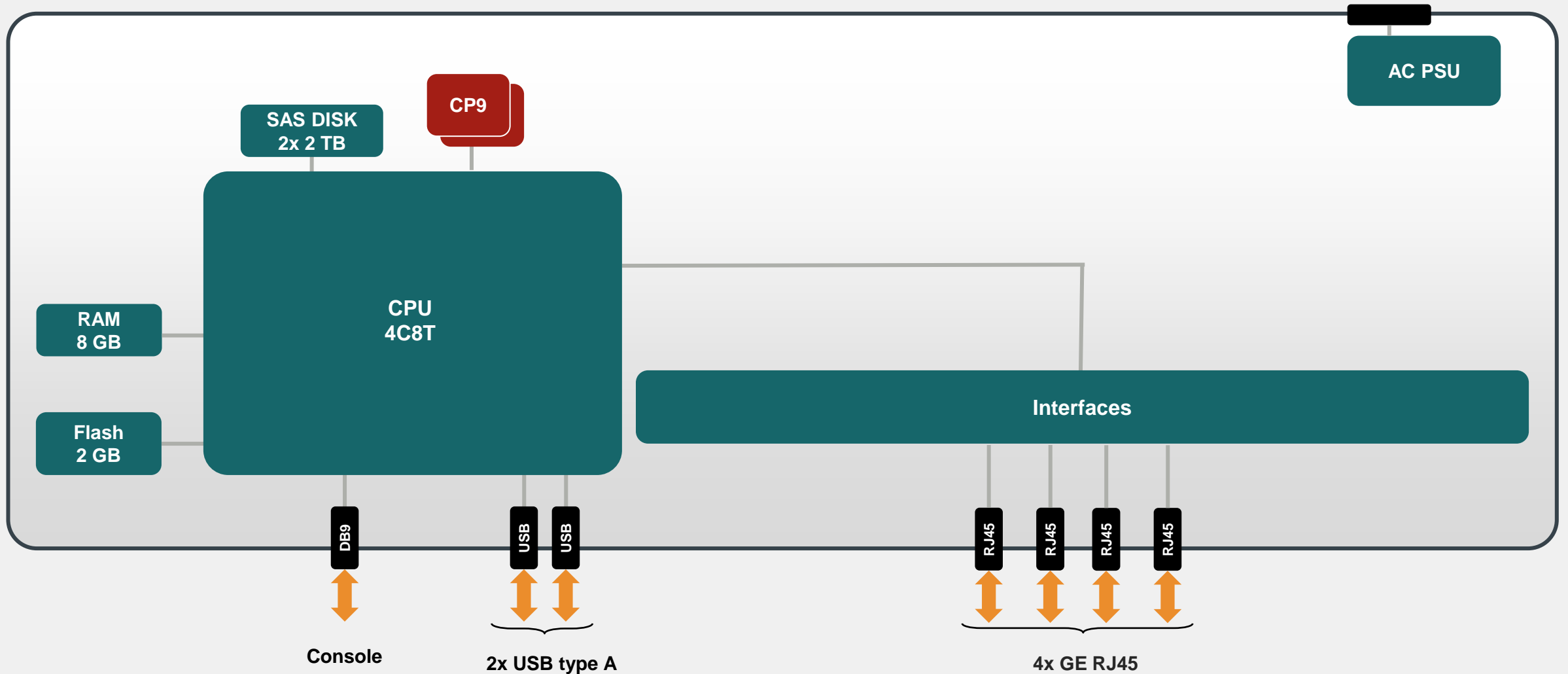




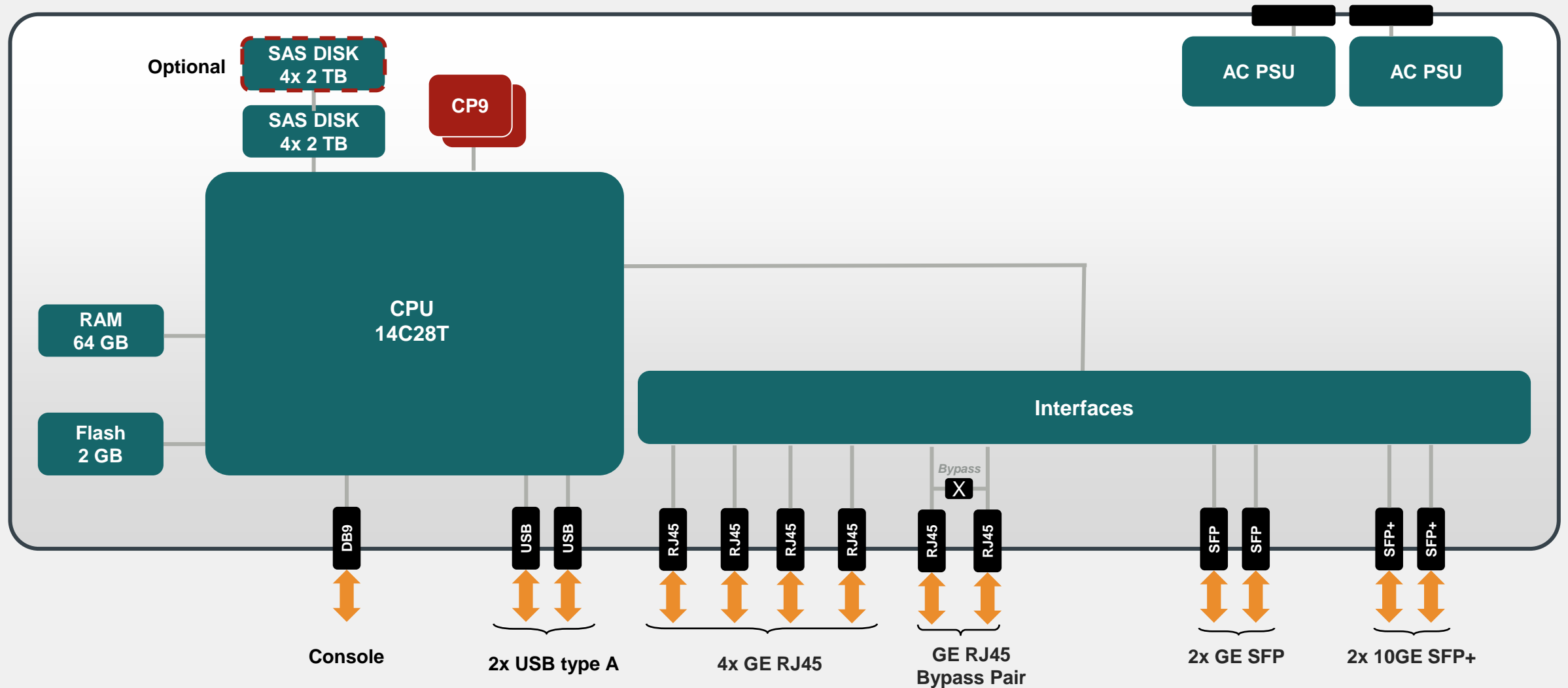
FortiProxy



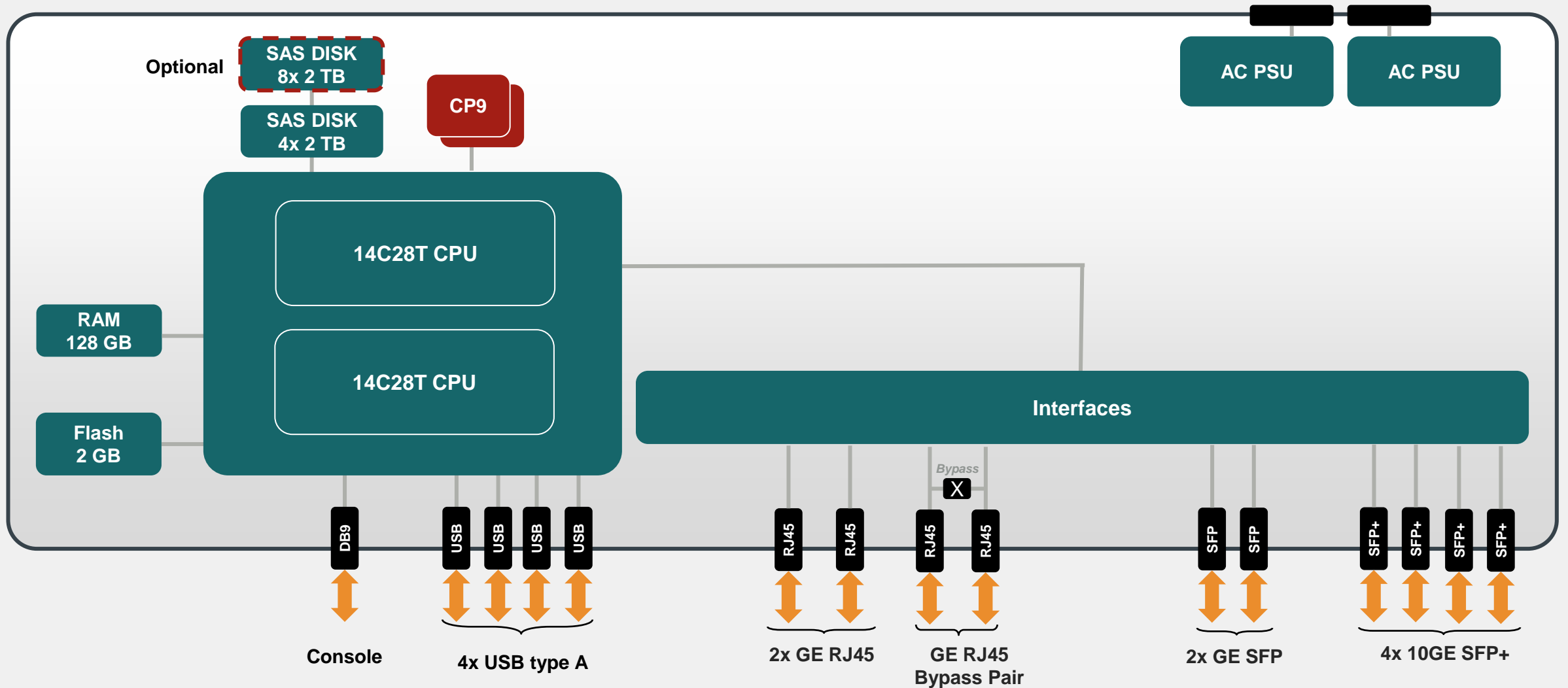
FortiProxy 400E Schematic



FortiProxy 2000E Schematic



FortiProxy 4000E Schematic

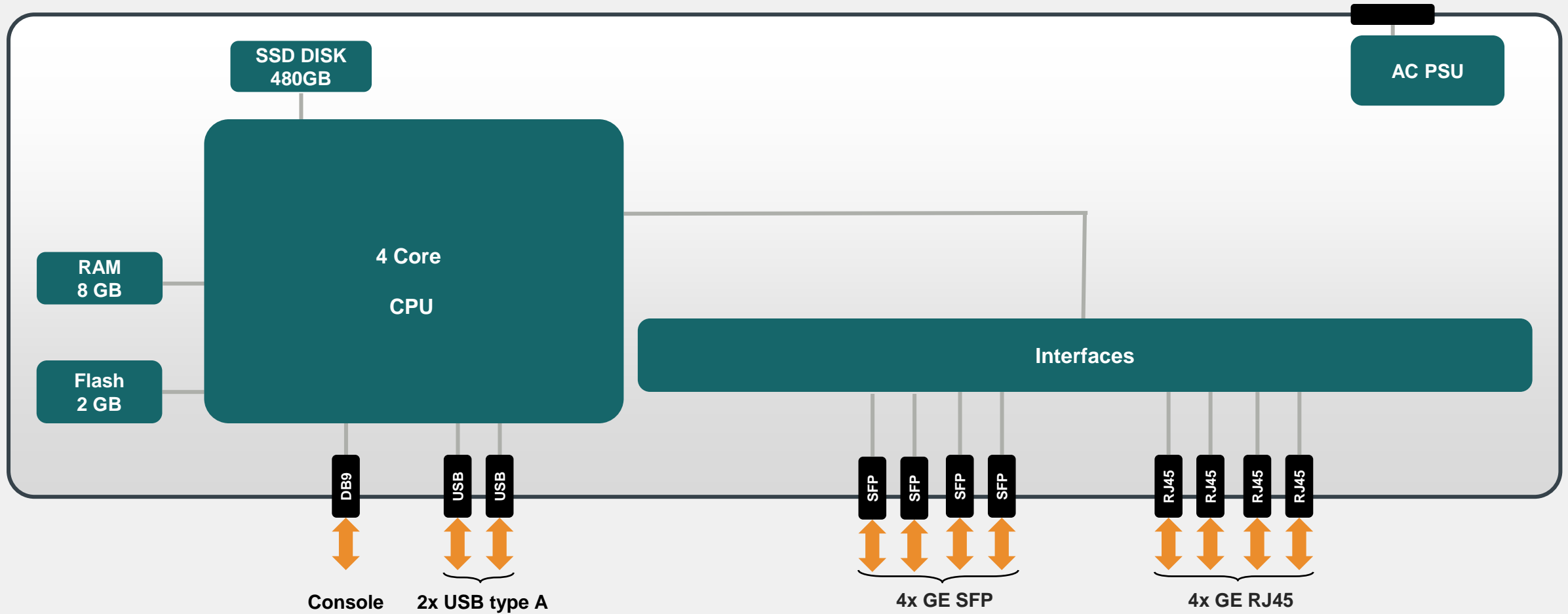




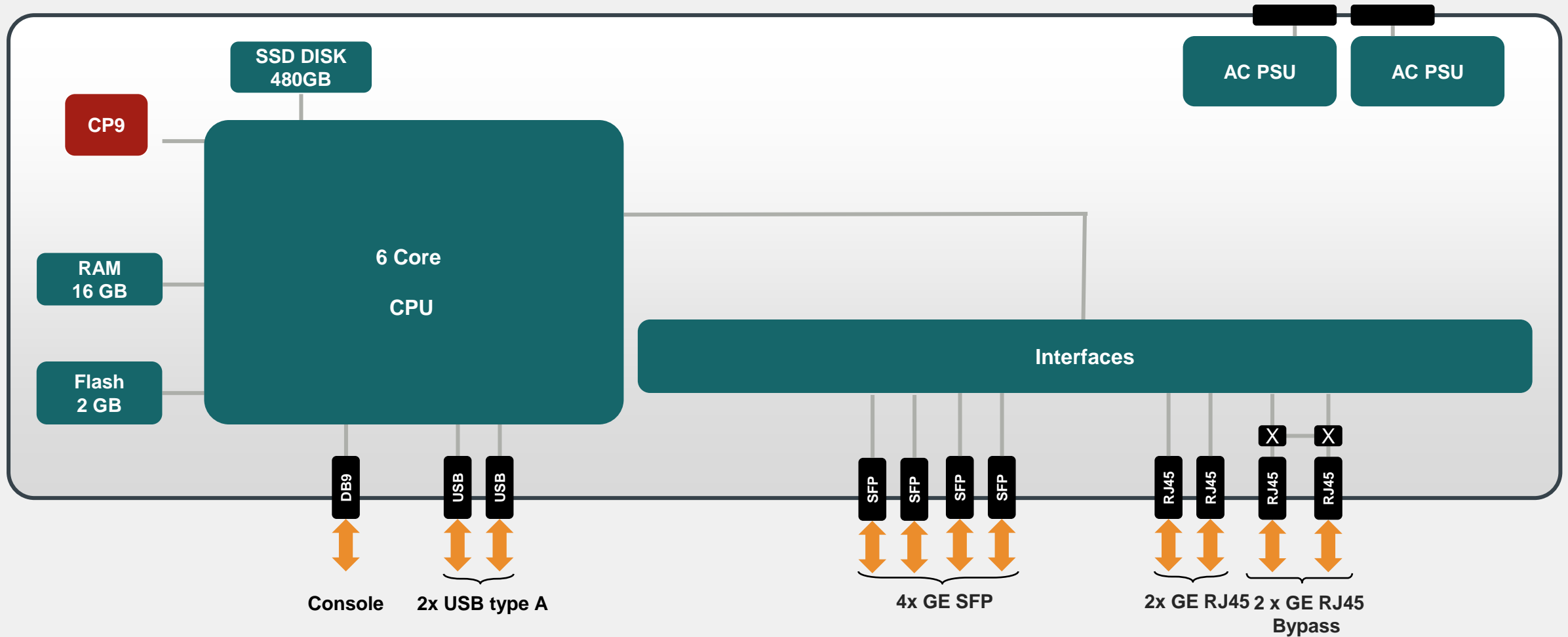
FortiWeb



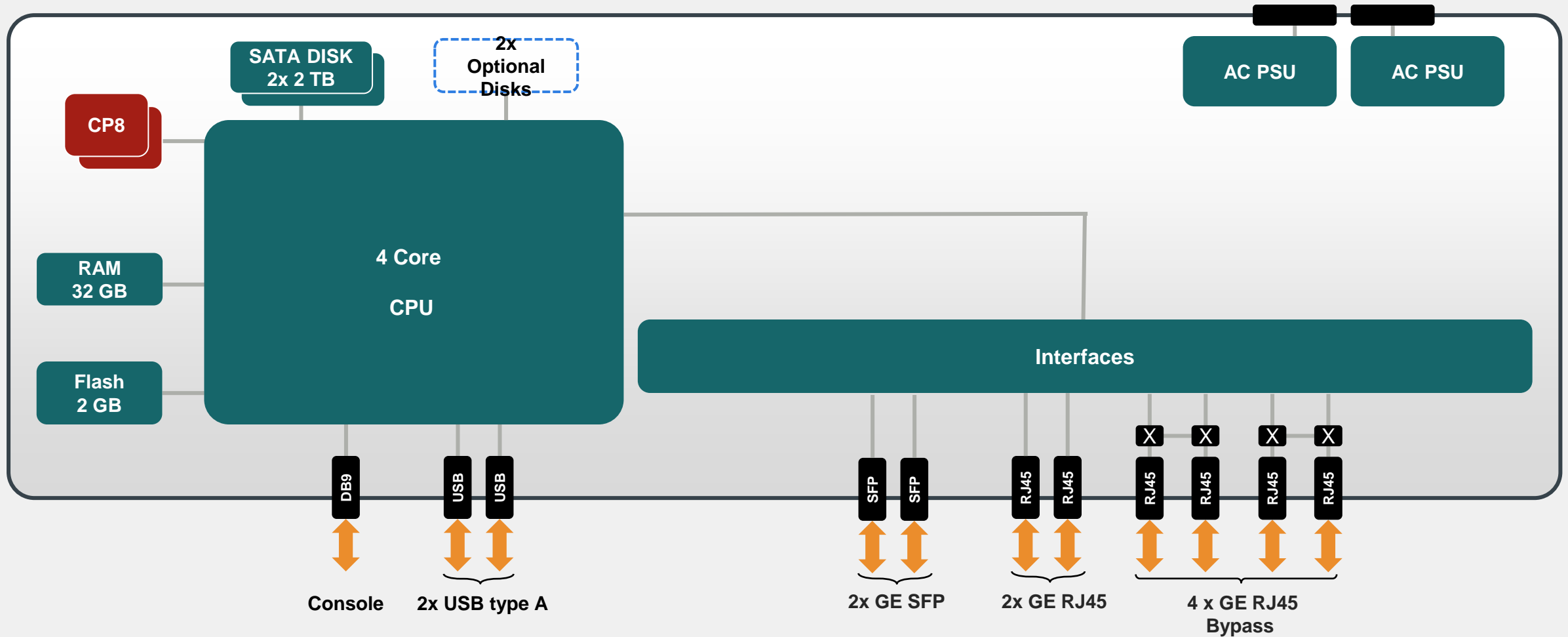
FortiWeb 400E Schematic



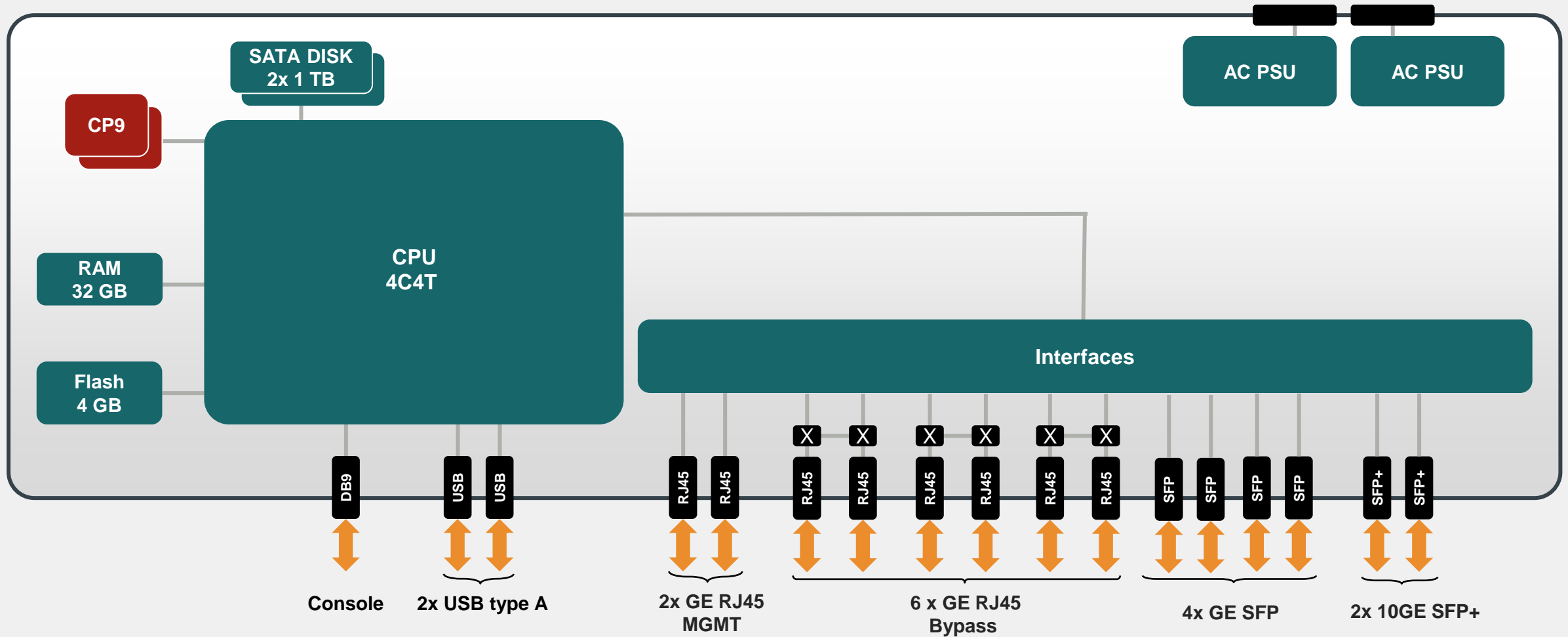
FortiWeb 600E Schematic



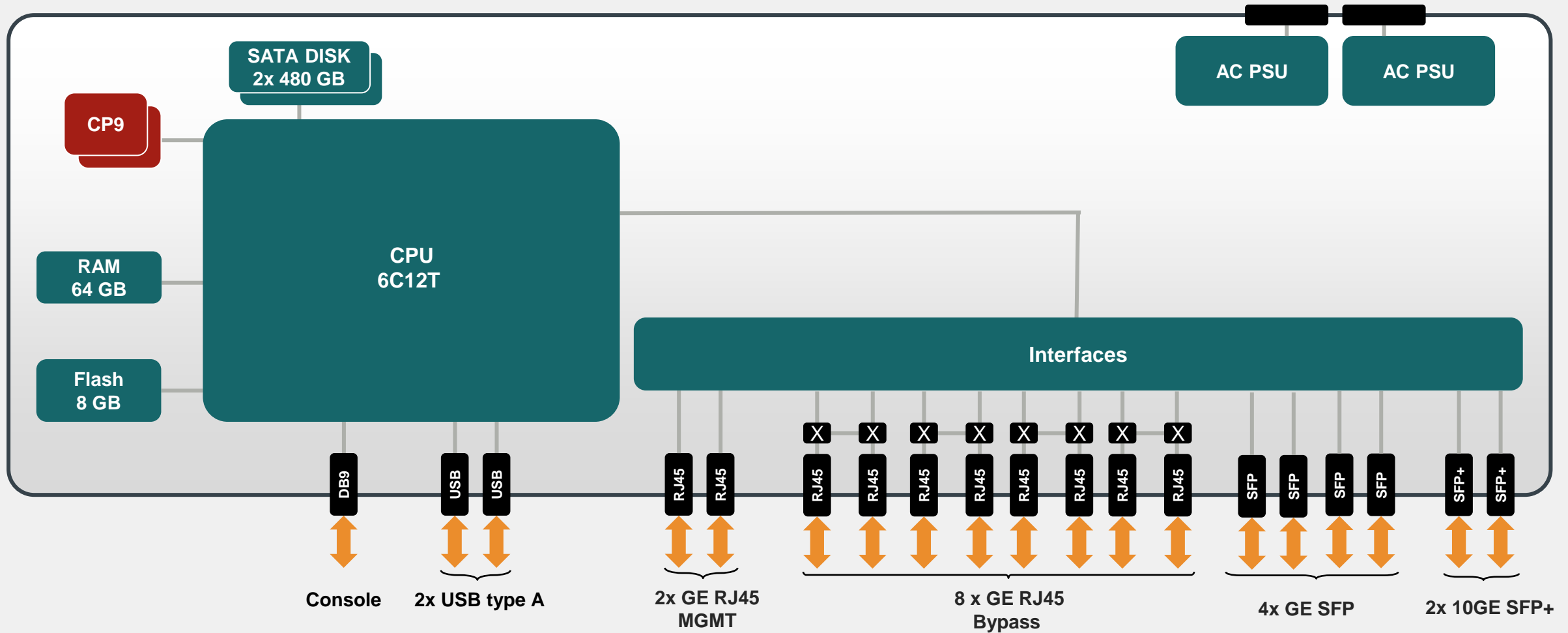
FortiWeb 1000D Schematic



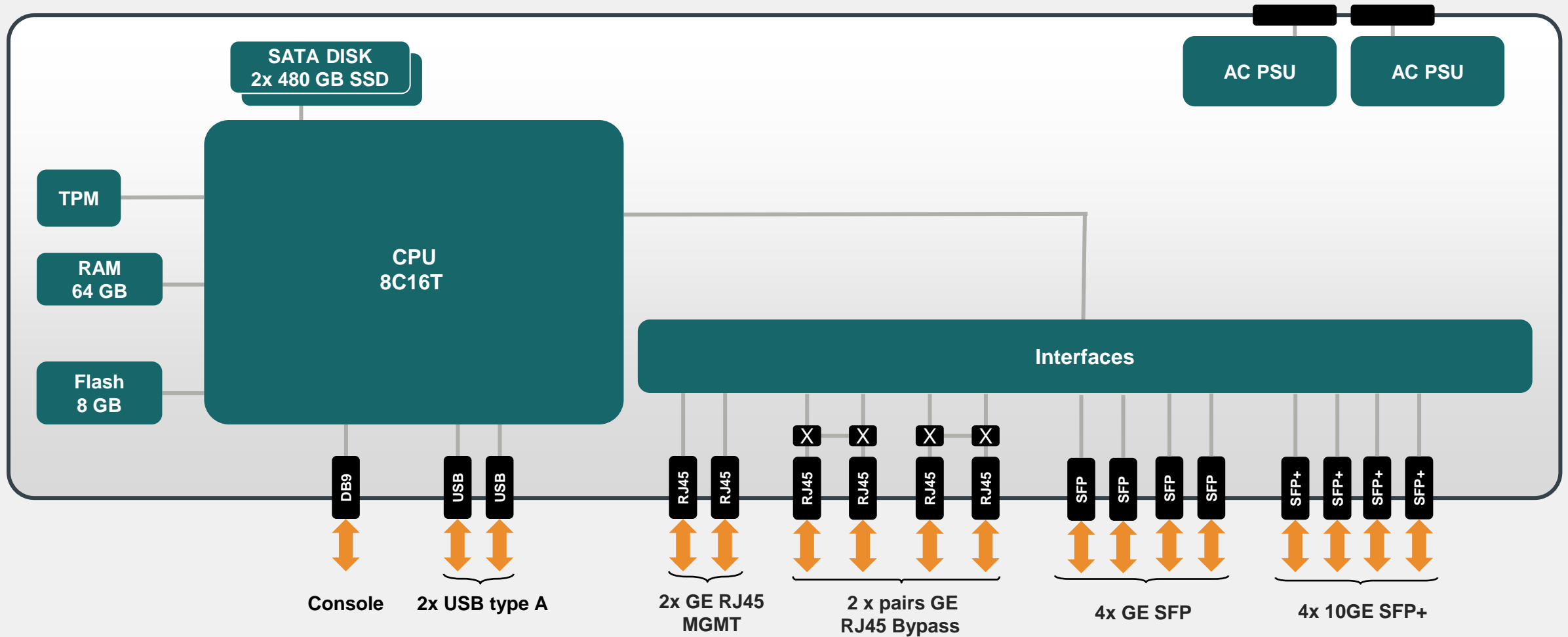
FortiWeb 1000E Schematic



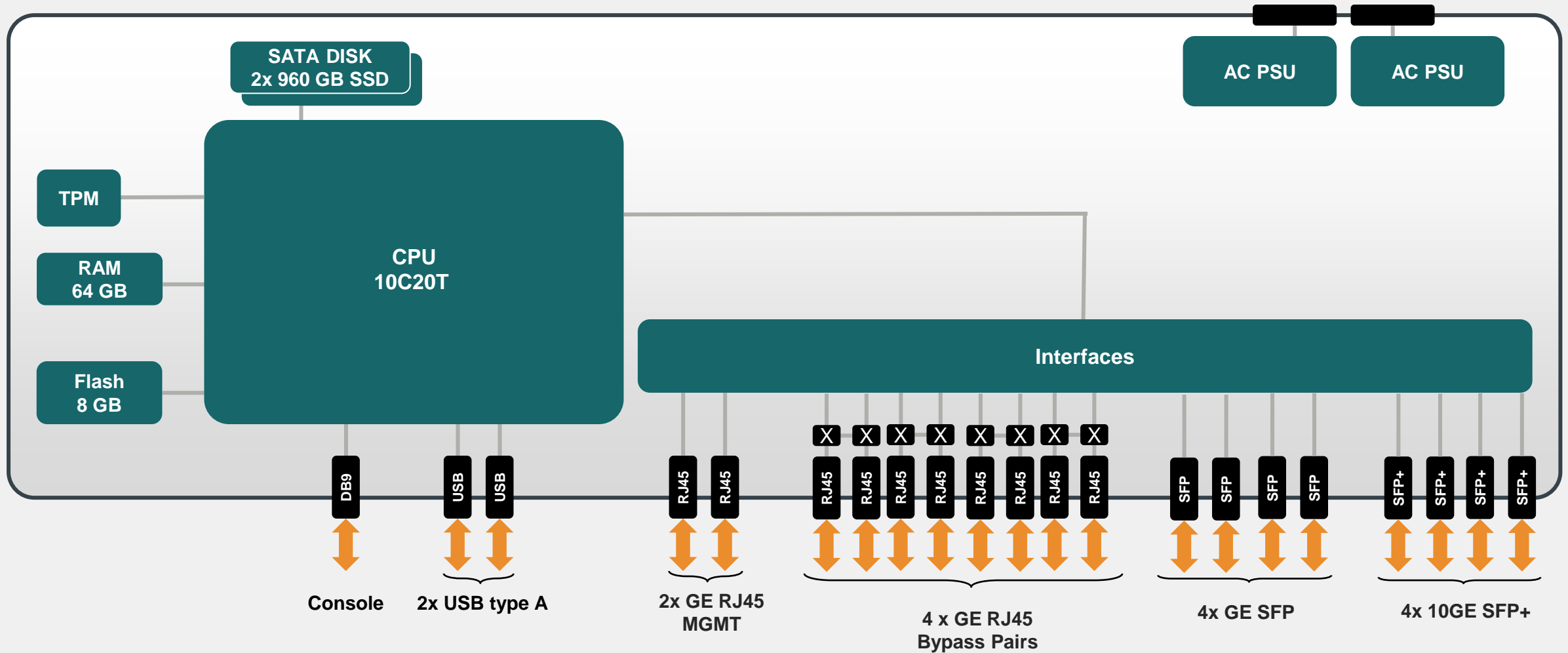
FortiWeb 1000F Schematic



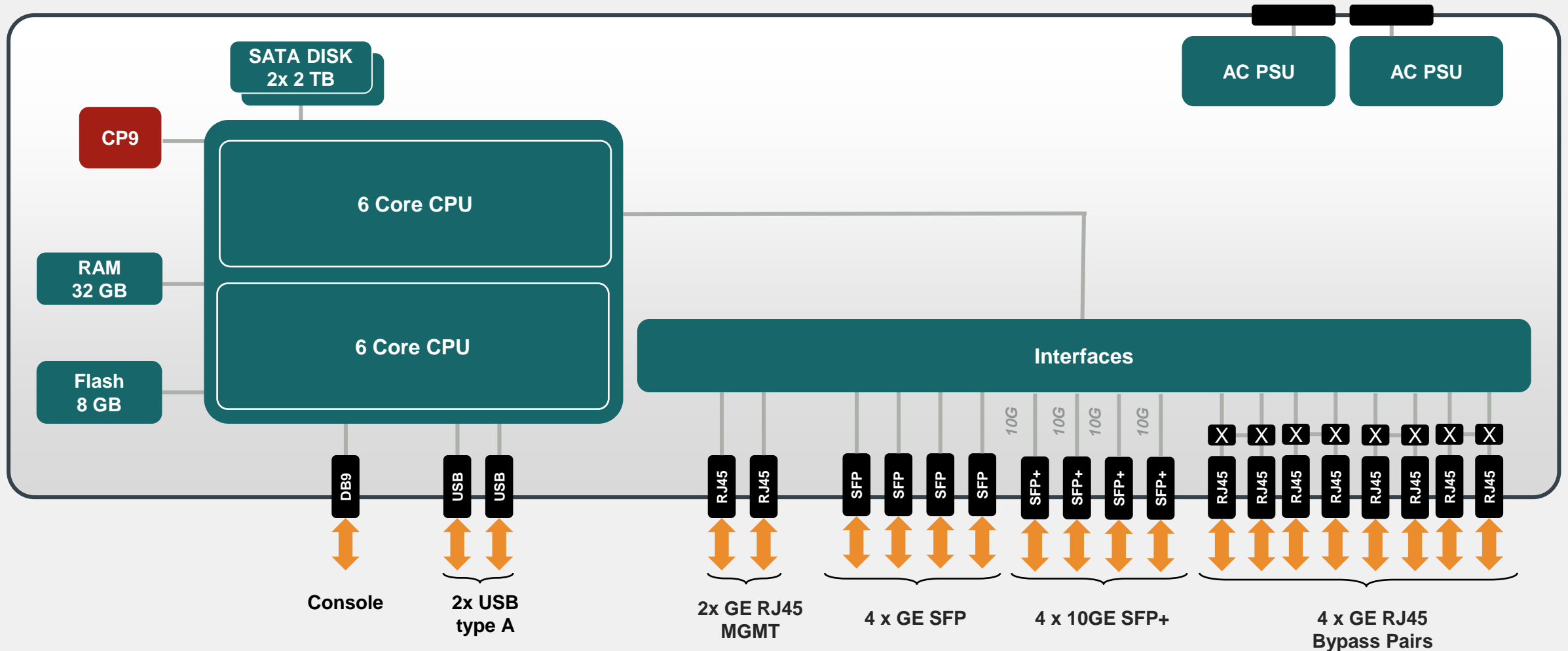
FortiWeb 2000F Schematic



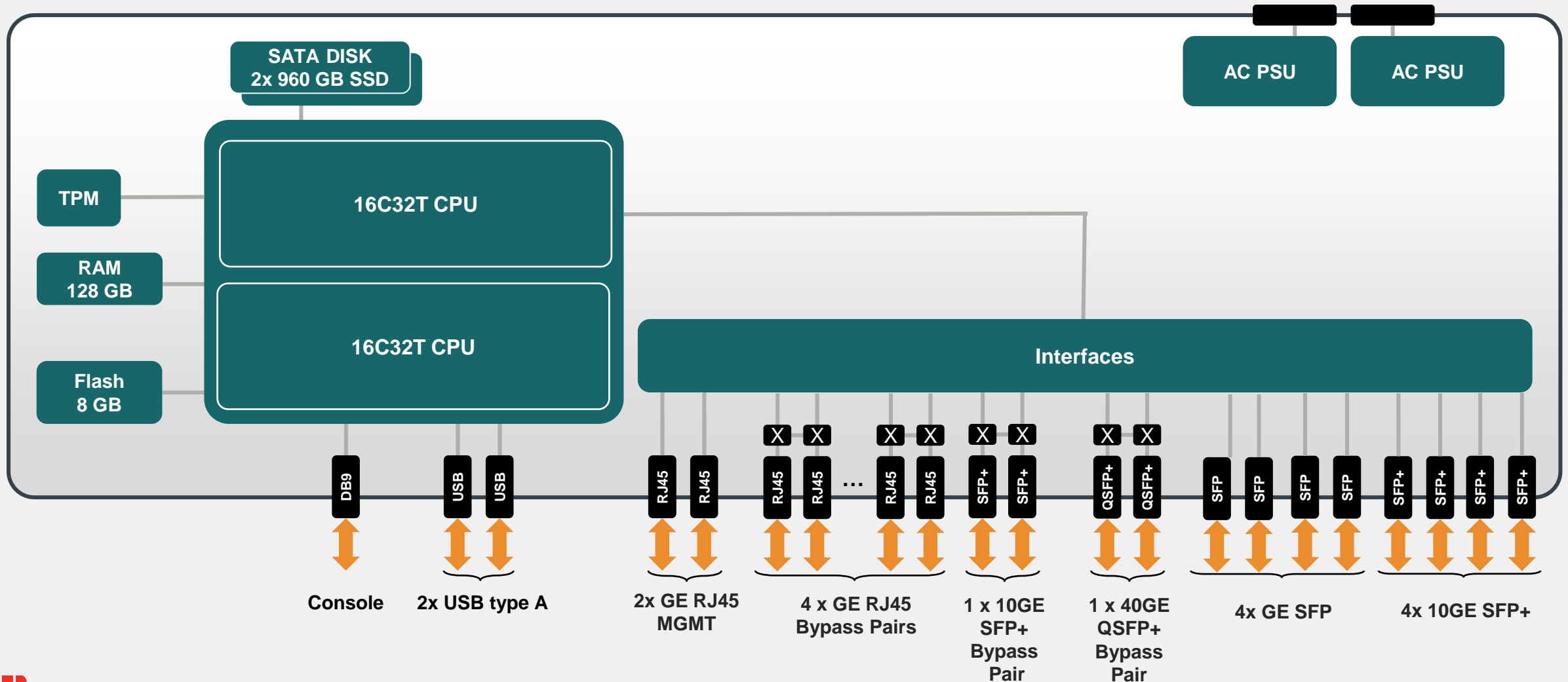
FortiWeb 3000F Schematic



FortiWeb 3000E Schematic



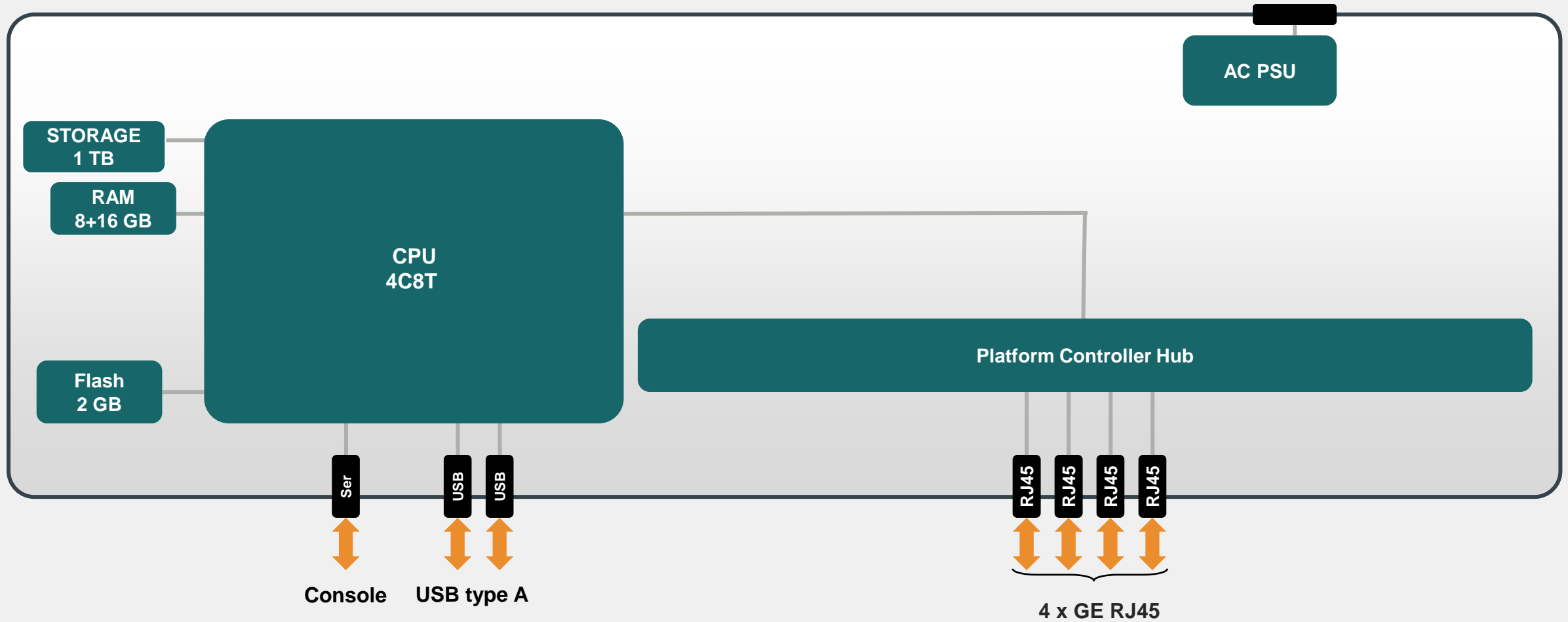
FortiWeb 4000F Schematic



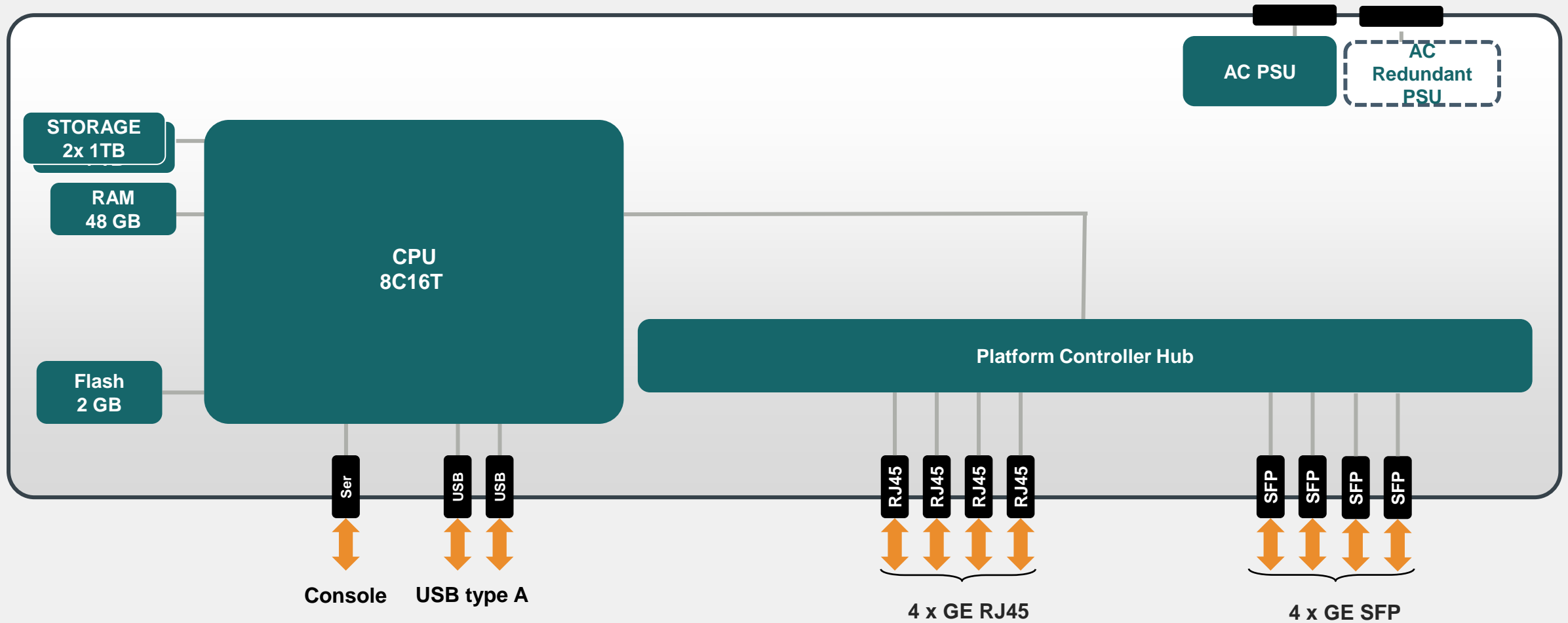
FortiSandbox



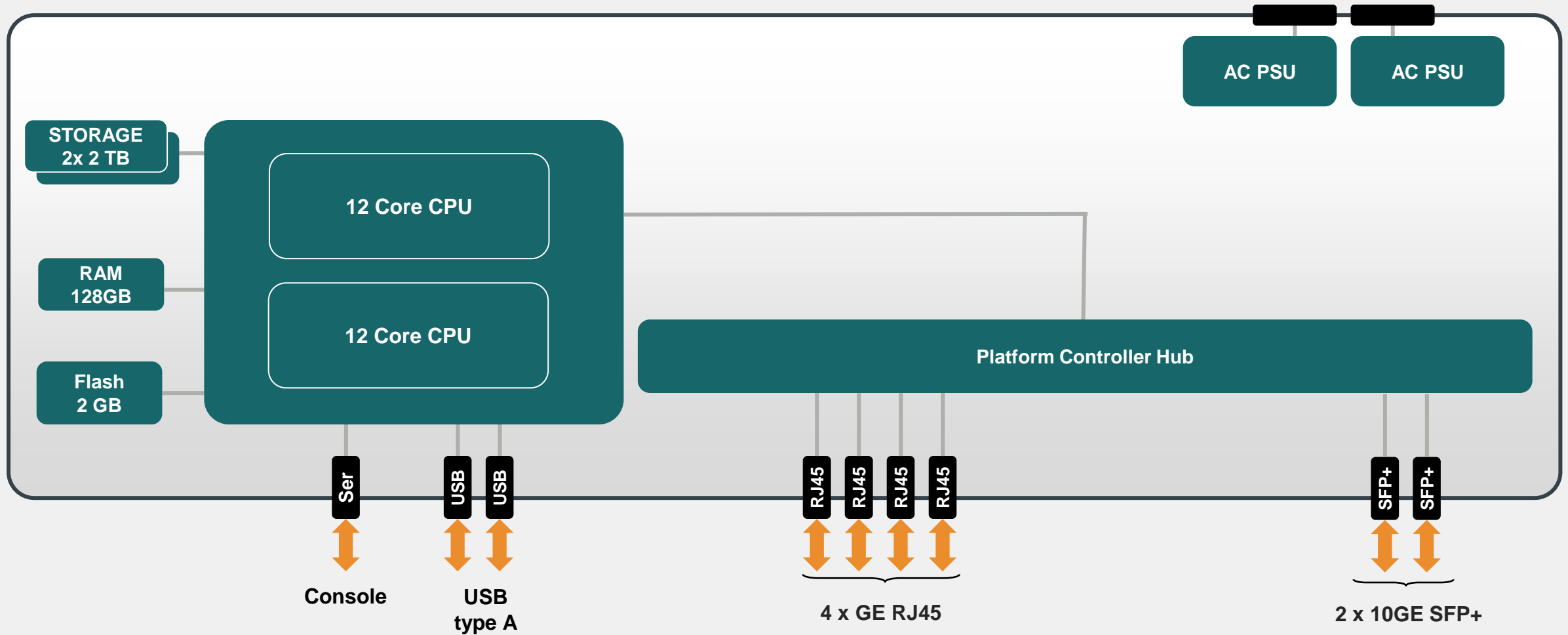
FortiSandbox 500F Schematic



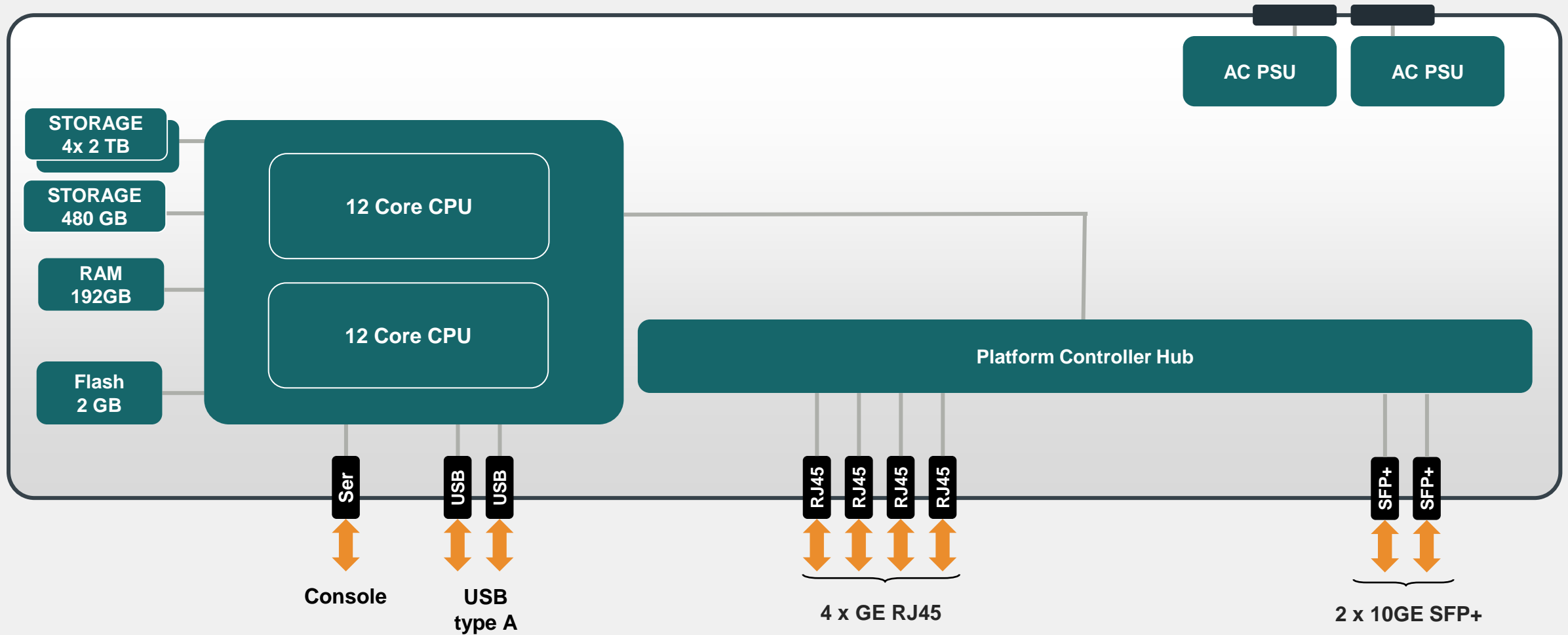
FortiSandbox 1000F Schematic



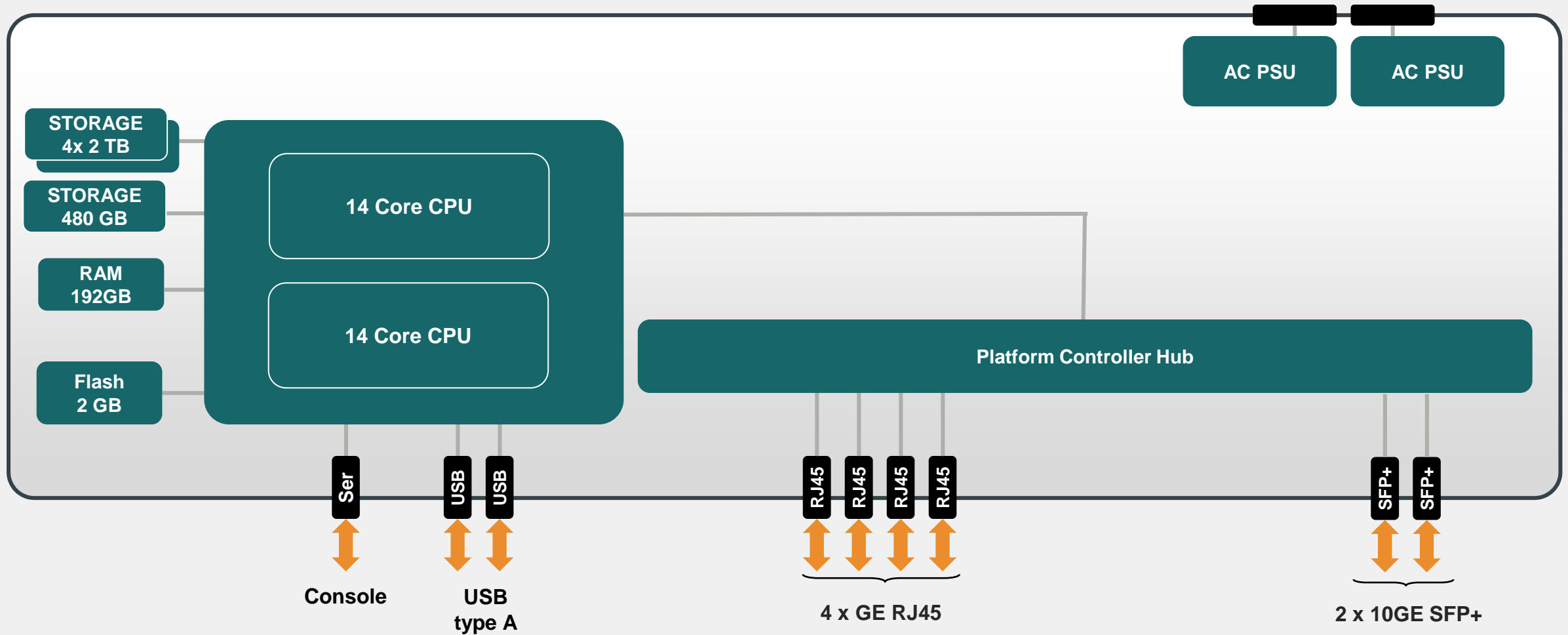
FortiSandbox 2000E Schematic



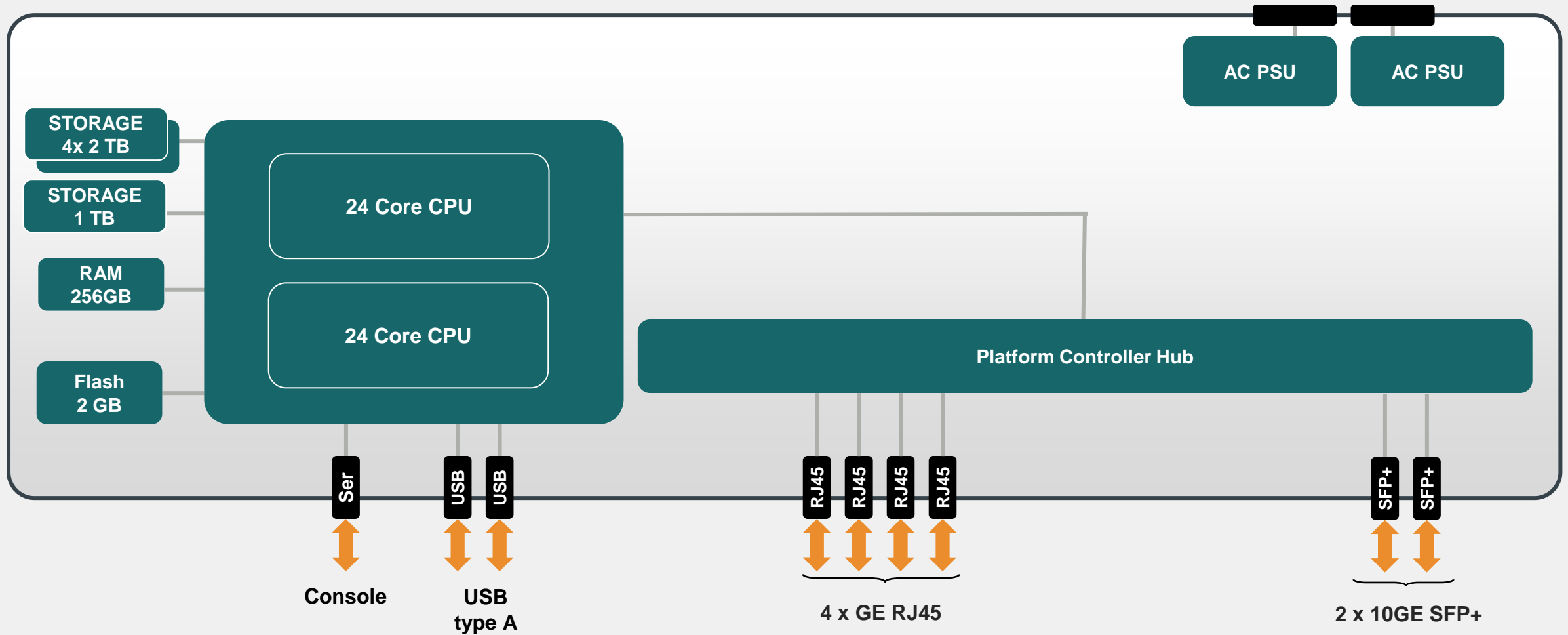
FortiSandbox 3000E/Gen2 Schematic



FortiSandbox 3000E Gen3 Schematic



FortiSandbox 3000F Schematic



Airflow Diagrams

are now on respective data sheets





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